DOCUMENT RESUME

ED 411 383 UD 031 919

TITLE	Talents Unlimited Revalidation Report Submitted to the Program Effectiveness Panel of the U.S. Department of Education's National Diffusion Network.
INSTITUTION	Talents Unlimited, Inc., Mobile, AL.
PUB DATE	1990-12-00
NOTE	105p.; For related documents, see UD 031 916-918.
PUB TYPE	Reports - Evaluative (142)
EDRS PRICE	MF01/PC05 Plus Postage.
DESCRIPTORS	*Academic Achievement; Communication (Thought Transfer); Decision Making; Elementary Education; Intelligence; *Minority Groups; Planning; Prediction; Productivity; Program Effectiveness; Program Evaluation; *Talent Identification; Teacher Education; Teaching Methods; *Thinking Skills
IDENTIFIERS	*Talents Unlimited Program

ABSTRACT

Talents Unlimited (TU) is a program that enhances students' creative and critical thinking skills within the framework of the regular classroom curriculum. Based on Calvin Taylor's theory of multiple talents and intellectual abilities, this program develops improved thinking in specific talent processes, including Productive Thinking, Communication, Forecasting, Decision Making, and Planning, with the Academic talent as a frame of reference for all activities. Through Talents-trained teachers, students learn that there are many ways to express their intelligence and that different types of thinking can be enhanced through training and practice. Through Talents training, classroom teachers internalize a schema of creative and critical thinking skills and learn to integrate them into the regular classroom curriculum. They learn to develop instructional activities that challenge students to manipulate factual information through the deliberate use of the Talents structure. Thinking skills taught in TU are neither grade level nor content specific, but may address any academic objectives to produce student response. However, the TU program was designed for implementation with heterogeneously grouped students in grades one through six. This report on the TU program relies on its implementation over 16 years in many sites. In 1989-90, TU was adopted at 2,033 schools across the country. Data for seven adoption sites are included to support the effectiveness of the TU approach. Seven appendixes contain sample teacher training and student activities, sample assessment items, and a newsletter for the program. Responses to questions from the Program Effectiveness Panel are also attached, along with some supporting material. (Contains 6 tables and 14 references.) (SLD)

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ED 411 383

Submitted To The

Program Effectiveness Panel

By

Talents Unlimited, Inc.
109 South Cedar Street
Mobile, Alabama 36602

December, 1990

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Office of Educational Research and Improvement
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Abstract

Goals: Talents Unlimited is a program which enhances students' creative and critical thinking skills within the framework of the regular classroom curriculum. Based on Dr. Calvin Taylor's theory of multiple talents and intellectual abilities, this program develops improved thinking skills in specific Talents processes including Productive Thinking, Communication, Forecasting, Decision Making and Planning with the Academic Talent as the frame of reference for all activities.

Purposes and Needs Addressed: Talents Unlimited addresses the immediate need for student instruction in critical and creative thinking skills within the parameters of the regular classroom curriculum. Through Talents-trained teachers, students learn that there are many ways to express their intelligence and that different types of thinking can be enhanced through training and practice. Student awareness of personal Talents or thinking strengths encourages positive self-concept. Through participation in Talents activities students improve in creative and critical thinking as well as in the ability to use the appropriate academic knowledge in new situations.

Method of Operation: Through Talents training, classroom teachers internalize a schema of creative and critical thinking skills and learn to integrate them into the regular classroom curriculum. With practice and technical assistance, teachers develop instructional activities which challenge students to manipulate factual information through the deliberate use of the Talents structure. Metacognition is congruent with talent development because students are aware of and in control of their thinking as they engage in these activities. The thinking skills taught in the Talents Unlimited model are neither grade level nor content specific but may address any academic objective(s) to produce unique student response.

Audience: Talents Unlimited was designed for implementation with heterogeneously grouped students in grades one through six.

Claim: Following technical training for teachers in the Talents Unlimited creative/critical thinking skills model, first through sixth grade students of varying ability levels in multiple settings demonstrated significantly greater gain in the specific Talents behaviors from pre to posttest than control groups.

Basic Information

A. Project Title, Location, Contact Person

Talents Unlimited, Inc. (TU)
109 South Cedar Street
Mobile, AL 36602
(334) 690-8060
(334) 433-8364 (FAX)

B. Original Developer, Applicant Agency

Mobile County Public School System
Dr. Carol Schlichter

C. Years of Project

Developed	1971 - 1974
Operated	1971 - Present
Evaluated	1972, 1973, 1974, 1979, 1984
Disseminated	1974 - Present

D. Source and Level of Development and Dissemination Funding

YEAR	FEDERAL	STATE	LOCAL	OTHER	TOTAL
71-72	152,000.00				152,000.00
72-73	152,000.00				152,000.00
73-74	119.021.00				119.021.00
74-75		35,000.00			35,000.00
75-76	79,334.00				79,334.00
76-77	NON-FUNDED				- 0 -
77-78	75,000.00				75,000.00
78-79	45,790.00				45,790.00
79-80	35,000.00				35,000.00
80-81	35,000.00				35,000.00
81-82	50,000.00				50,000.00
82-83	59,091.00				59,091.00
83-84	NON-FUNDED				- 0 -
84-85	50,000.00			6,970.00	56,970.00
85-86	54,945.00				54,945.00
86-87	55,000.00				55,000.00
87-88	NON-FUNDED				- 0 -
88-89	75,000.00				75,000.00
90-91	85,000.00				85,000.00

I. Description of the Program

A. Goal

Talents Unlimited is a process model whose ultimate goal is to foster critical/creative thinking skill development in children grades 1-6 To attain this goal, teachers are trained to develop and implement activities which utilize six talents or thinking skills (i e , Academic, Productive Thinking, Forecasting, Communication, Planning, and Decision Making) Each activity facilitates the internalization of academic content while addressing a specific thinking process This deliberate approach to thinking skills instruction fosters application of learning rather than performance of tasks in isolated contexts

B. Purposes and Needs Addressed

Current research has enormously broadened the traditional definition of intelligence Pioneering research in the fifties by J P Guilford (1966) and Calvin Taylor (1968), and recent research by Howard Gardner (1983), Robert Sternberg (1984), and Joseph Renzulli (1986) indicate intelligence tests measure only a small portion of human intellectual ability Research strongly supports the theory that intelligence is multifaceted It is clear that a pedagogical approach dedicated only to storing factual information ignores many other vital areas of student intellectual potential To contribute and compete in tomorrow's world, students today must be taught to access and process information Instruction in critical and creative thinking skills is no longer a luxury; it is a necessity

Government is concerned Both the 1983 "A Nation at Risk" report and the "National Goals for Education" issued by President Bush and governors in 1990 called for immediate, sweeping changes in current educational practices and standards

Business is concerned According to John L Clendinin, CEO, Bell South Corporation and Chairman, U S Chamber of Commerce, "The bottom line is, America's fight for long term competitiveness ultimately will be won or lost not in the halls of Congress not in the boardrooms around the world but in America's classrooms" (Doyle, 1989)

The public is concerned Three-fourths of the people interviewed for "The 22nd Annual Gallup Poll of the Public's Attitudes toward Public Schools" (Phi Delta Kappan, 1990) attach very high or high priority to all six of the national goals for education When questioned about the third goal which alludes to every school in America insuring "that all students learn to use their minds well, so they may be prepared for responsible citizenship, further learning, and productive employment," 88% of those adults surveyed rated this goal as a very high or high priority during the coming decade However only 47% thought that it was very likely or likely that this goal could be reached

Educators are concerned and searching for answers Obviously, there is an enormous chasm between governmental, business, and public imperatives and practical classroom application Dedicated educators who agree with these lofty goals have become frustrated and discouraged attempting to breach the gulf between goals and student success They have found that the same educational system which acknowledges these needs and mandated educational reform, offers few specific directives towards achieving these worthy objectives

Talents Unlimited is a highly successful research-based model which develops the multiple talents of students by engaging them in metacognitive activities which enhance thinking skills In so doing, Talents offers practical classroom strategies for achieving five of the six "National Goals for Education " Talents is a staff development model which provides teachers with skills and structure to facilitate students' systematic growth in creative/critical thinking skills These thinking skills can be applied to all curriculum areas in a regular classroom situation and also relate to world of work skills This approach can ensure success of all students despite racial, economic, or cultural diversity through practical application of academic information in relevant contexts. When students experience success in these processes, improved self-esteem and greater academic achievement can result.

C. Intended Audience

Talents Unlimited is a staff development process model for teachers of grades 1-6. It is intended to be used with all groups of children within these grade parameters regardless of ability level, race, ethnic group or income level.

D. Background, Foundation and Theoretical Framework

The theoretical and research background for Talents Unlimited grew out of the work of Dr. Calvin W. Taylor of the University of Utah who has explored the development of creativity and researched the creative process for over 30 years. His Multiple Talent Approach to education has been described extensively in his writings and is summarized, prior to the beginning of the Talents Unlimited project, in an article for a special "creativity" issue of the Journal of Research and Development in Education published in 1971 (Taylor and Lloyd, 1971). A companion article in the same issue described Project Implode, a program using the Multiple Talent Approach to education which was a forerunner of Talents Unlimited (Stevenson, 1971).

The final theoretical model developed by the TU staff is a combination of Taylor's "Totem Pole Model" picturing the Multiple Talent Approach and Guilford's Structure of the Intellect Model, a comprehensive description of intellectual abilities which has enabled researchers to gain insight into the nature of creativity and the creative process. The TU staff was directed by Dr. Carol Schlichter for the first three years (1971 - 74) and is currently headed by Ms. Brenda Haskew.

The TU model identifies six talent areas in much the way Taylor did with the Multiple Talent Approach. The traditional academic talent is incorporated in the model as a means for helping students gain knowledge in a variety of disciplines, while the other five talents are used as vehicles to assist students in processing or using the knowledge to create new solutions to problems. Taylor theorized that 90% of the children in school would be above average in at least one of the six talent areas, provided those talents have an opportunity to develop. The Talents Unlimited research team operationalized each talent process so that creative/critical thinking skills could be taught by classroom teachers thus providing an area of success for all students while reinforcing academic knowledge. This program is not a specialty program, but an approach which permeates all phases of instruction.

E. Features - How the Model Works

Talents Unlimited is a teaching/learning process model which addresses creative and critical thinking skills through teacher implementation of specially designed activities which are implemented across all areas of the curriculum.

Initial Teacher training and subsequent technical assistance are essential for the effective use of this model with students. The Teacher in Training (TNT) component of Talents Unlimited requires a minimum of 12 hours of in-service instruction facilitated by certified trainer in the Talents model (see Appendix I). During these sessions, the trainer familiarizes the participants with the history of the model, the research supporting its effectiveness, and the philosophy behind the Multiple Talent Approach to teaching children. The trainer shares actual student responses, presents Talents-developed video tapes of classroom implementation, and engages the teachers in large and small group "hands on" participation in Talents activities. This approach allows the teachers to experience the motivating nature of TU activities and facilitates their understanding of Talents as an approach to curriculum and instruction rather than an add-on program. Through trainer modeling of Talents implementation and guided practice sessions, the teachers learn to develop Talents lesson plans integral to their specific curricular areas. This structured exposure to the model enables teachers to internalize these creative/critical thinking processes and to incorporate them into other instructional strategies already in place in their classrooms.

Through the use of the key words and phrases of Talents "Kid Talk" (see Appendix II), the teacher deliberately makes the students aware of the thinking process as well as the academic information to be used in the activity. As students manipulate the factual information, they are cognizant of and in control of their thinking - metacognition.

The teacher determines which talent best addresses the needs of the students in relation to the content. The use of Productive Thinking results in the generation of a list of ideas. For example, as a science activity students may list many, varied, unusual items which might be found in Galileo's trunk. The Communication talent generates language (i.e., single words, phrases, network of ideas, body language). During a physical education study of famous athletes, students may use this talent to write a letter introducing Michael Jordan to a group of foreign dignitaries. The Forecasting talent generates causes or effects of a situation. In math class, students might consider the many, varied effects on our lives if all numbers disappeared. The Planning talent generates a plan for a product such as an art project, for example a card to give on Mother's Day. Lastly, the Decision Making talent generates an accountable decision based on criteria. Students may use this talent in reading class to choose a book for a book report.

Although the Talents Activity Packet (see Appendix III) is available as a teacher resource for Talents teaching ideas, the goal of this process model is to develop the teacher's ability to create original Talents lesson plans which enhance the thinking skills while simultaneously addressing an academic objective.

The motivating nature of Talents activities piques student interest and at the same time encourages student internalization of information. Talents provides each student a frame of reference for tapping into the content. This instructional approach acknowledges the diversity of student strengths in a classroom setting and class as a whole. The children who are strong in one talent area model for the rest of the class while challenging others to stretch to improve in that talent area.

The Talents Criterion Referenced Tests (CRT) (see Appendix IV) were developed to monitor and evaluate student progress in these thinking skills. These tests focus on the assessment of each of the Talents in a pretest/posttest format. They have proven to be very effective and innovative measures of progress, but are time-consuming to administer and costly to score. As an alternative, there are whole class assessment techniques for Talents which some school systems select as monitoring instruments of student progress (see Appendix V).

F. Significance of Program Design as Compared to Similar Programs

Talents Unlimited, as an approach to metacognition, is as fresh and innovative today as when it was first developed and validated. The following are features which distinguish it from other thinking skills programs, most of which have been validated by the Program Effectiveness Panel (Educational Programs That Work, 1990).

1. Talents infuses metacognition into all curricular areas. This aids the transfer of academic content to new situations through the relevant use of the creative/critical thinking skills. Thinking skills programs like CORT, Instrumental Enrichment, Philosophy for Children, and Structure of the Intellect are based on a curriculum separate from that of regular classroom instruction.
2. Talents instruction is intended for use with all students, while HOTS focuses primarily on Chapter 1 students, and SAGE targets the gifted and talented student population. Many children, therefore, are left out of these opportunities.

3 Talents workshops train teachers to independently integrate metacognition into the curriculum. Although Talents frequently extends to school-wide and district-wide implementation, a Talents-trained teacher can implement the Talents model even if no other educator adopts its use at the school site. KIDS Kits, on the other hand, is based on school-wide participation with a single staff member serving as program coordinator. This person receives more training than others at the site, thereby limiting staff development opportunities and potential for professional growth of others on the faculty.

4 Talents Unlimited is a staff development model which empowers teachers to utilize the structure of the model to add a metacognitive component to any and all academic content. Teacher input into its application facilitates teacher ownership of the process as well as ownership of the activities the teacher develops. A program such as ICE allows for limited teacher creativity and input due to its set curriculum format.

5 Talents implementation does not require the purchase of equipment for the utilization of the program. The teacher-class interaction provides the motivation. This person-to-person approach is in contrast to the HOTS program which requires computer technology and KIDS Kits whose use necessitates audiovisual equipment and materials which might not be accessible to the teacher at the "teachable moment" for the students in the class. If such technology is available to the Talents-trained teacher, Talents implementation may be extended to these resources as well, but they are not integral to the program. This enables under-funded school systems to provide the teaching of creative/critical thinking skills for all students.

II. Potential for Replication

A. Settings and Participants (Development and Evaluation Sites)

Although specific demographic data on student populations in the original and subsequent research are available in the "Description of Methodology" of this document, it can summarily be said that Talents has been successfully implemented in many, varied educational settings across the United States. Minorities involved in the research cited include black, Hispanic, native American as well as Alaskan Eskimo. Schools in small communities and large cities representing education in rural, suburban and urban America testify to the transportability of this model.

B. Replicable Components and Documentation

The Talents Unlimited program in its entirety has proven itself most appropriate for dissemination to other sites. In the 1989-90 school year, for example, Talents was adopted at 2,033 school sites across the nation. In its sixteen-year history, Talents staff has developed many strategies to facilitate successful implementation. Early in the history of the model, teacher training materials, exemplary Talent activity lesson plans (TAP) and a battery of Criterion Referenced Tests were developed. These materials have been updated several times and are still available. Preliminary materials for certified trainer candidates and a training manual were specifically designed to Activate Certified Trainers (ACT).

Because Talents is a teacher training program, materials have been developed to assist the cadre of certified trainers (CT), now numbering 212, who conduct Talents training nationwide. In addition to teacher training materials such as model lesson plans, video tapes and hands-on activities designed to facilitate teacher understanding of the model, a Certified Trainer Newsletter (see Appendix VI) informs CT's of new developments and events of common interest like the biennial National Talents Unlimited Conference. Every two years CTs' are required to participate in a recertification process which includes an evaluative instrument such as the Talent Reactor (see Appendix VII) to measure understanding of the model as well as self-perceived presentation skills. Certified trainers are also required to submit monthly reports to the Talents office detailing their training activities.

C. User Requirements

From the teacher's point of view, the minimum requirement for classroom implementation is a two-day/12 hour initial training workshop conducted by a Talents certified trainer. After this training, teachers will know how to design lessons which facilitate academic objectives using these processes.

D. Costs

Talents has always been a cost-effective model. On an average an adopter spends approximately $2500 to conduct an initial training session for Talents. This includes travel expenses, meals and lodging for a consultant as well as a materials fee of $25 for each participant. Workshops accommodate as many as 30 teachers. With each teacher impacting 25 students, the cost for the first year of a Talents Unlimited adoption would therefore be approximately $3.33 per child. Technical assistance in subsequent years is important to the optimum success of the adoption. Although the types of technical assistance needed varies, many implementation questions and concerns can be handled by phone or correspondence through a local certified trainer or the national Talents office for the cost of postage or a phone call. Considering this modest technical assistance investment, as a teacher uses the Talents model year after year, the per child cost factor will lower significantly.

III. Evidence

A. Claim

Following technical training for teachers in the Talents Unlimited creative/critical thinking skills model, first through sixth grade students of varying ability levels in multiple settings demonstrated a significantly greater gain in the specific Talents behaviors from pretest to posttest than control groups.

B. Description of Methodology and Results

In its sixteen-year membership in the National Diffusion Network, Talents research has been endorsed by the Program Effectiveness Panel or its predecessor, the Joint Dissemination and Review Panel, on three previous occasions. Due to the complexity and number of these many, varied studies, the description of methodology and results will be divided into three sections chronologically arranged:

1. Original Research 1973-74
2. Replication Studies 1979-80
3. Recent Studies

1. Original Research 1973-74

The first published documentation of the project's success is the report written after the second year. Analysis of data was completed and documented by Chissom and McLean (1980), professors in the area of Behavioral Studies at the University of Alabama. The experimental design used in the project was declared sound and enabled Talents to be validated after the third year. Four experimental and four control schools, matched for socioeconomic level and racial composition were selected. Thirty-seven teachers in grades 1-6 participated as Talents teachers for the entire three year period, definitely a positive aspect of the research. Students in the experimental and control schools were pre and posttested using specially developed instruments to measure skill development in critical and creative thinking.

The focus on critical/creative thinking in addition to the traditional academic curriculum led to the development of procedures and instruments to assess student progress in each of the six Talent areas. These measures, entitled collectively the Criterion Referenced Tests, were created after project personnel had ample opportunity to observe and analyze student talent development.

Possible items on the tests were carefully examined and field tested before inclusion. Specific guidelines for selection were established to carefully monitor all items being considered. For example, items had to be of a general nature, free from regional reference and at the same time lend themselves to being legitimately completed in a relatively brief time.

Instructions for the administration of the tests were developed with provision for a Primary form which allowed students in grades 1-3 to pictorially record their responses with labels added later by proctors and an Intermediate form with identical test items which allowed students in grades 4-6 to write their own ideas.

The tests that finally emerged were thoughtfully criterion referenced. They were based upon an analysis of teacher and student behaviors, with the test situations selected from project-developed instructional materials that met the stringent, specific guidelines, thus assuring a level of content validity. A scoring system was developed. The student talent behaviors helped to identify scoring dimensions for each task. Scoring procedures emerged as the project leadership personnel applied "Arbitrary Judgement Guidelines" to the test situations they had selected.

After project leadership personnel developed competency in applying the scoring procedures to test situations, they then trained a team of three graduate students from the University of Alabama to score the tests. The inter-grader reliability of the scoring was checked. When found to be unsatisfactory, additional training sessions were provided until an acceptable degree of grader agreement was obtained. Inter-grader reliability was based on a sample of pretest papers for each of the five Talents. The reliability coefficients computed were as follows: Planning (.92); Decision Making (.88); Forecasting (.91); Productive Thinking (.98); Communication (.93).

The battery of ten tests, one for Decision Making, one for Forecasting, one for Planning, three for Communication and four for Productive Thinking, proved to be sensitive to differences in instruction among teachers. Children in the project's experimental schools outperformed children in the control schools on twenty-eight of the thirty test score comparisons that were made.

However, the experience gained in administering and scoring the tests and analyzing the test results led the staff to believe that the tests could be strengthened by certain revisions. In general, the changes were designed to produce an improved correspondence between intended and actual talent processes of children responding to each test situation.

Talents Unlimited Criterion Referenced Tests in their present form have been used by many adopting schools and districts to evaluate their programs. They are scripted and designed to be administered by classroom teachers who have had no formal training. Scoring of the tests is done only by carefully trained personnel certified through workshops patterned after the original seminars for certified scorers. Results of the comparison between experimental and control groups on the Criterion Referenced Tests for all five talents are contained in Table A and summarized in Table B.

Table A
Experimental vs. Control t values for Change Scores by Grade Levels for All Talents

Grade	Planning t value	Decision Making t value	Productive Thinking I t value	Productive Thinking II t value
1	1.11	0.95	2.79*	2.57*
2	1.86	1.87	4.14*	3.86*
3	3.43*	1.47	1.29	1.58
4	5.13*	1.90*	4.00*	5.96*
5	2.59*	0.70	3.56*	3.54*
6	3.07*	1.39	1.48	3.42*
Grade	**Forecasting t value**	**Communication I t value**	**Communication II t value**	**Communication III t value**
1	2.73*	0.58	2.15*	-0.17
2	3.42*	3.67*	1.70	2.24*
3	2.82*	1.85	0.27	-1.97*
4	2.00*	4.18*	3.76*	1.98*
5	1.40	0.73	-0.28	0.61
6	1.14	-2.19*	3.71*	1.51

$p < .05$ A negative t value indicates control group outperformed experimental group.

Table B
Summary of t values on the Criterion Referenced Tests Comparing the Experimental and Control Groups

Grade	Experimental			Control	
	N	*Number Sig.	Number Non-Sig.	N	*Number Sig.
1	30	4	4	26	0
2	33	5	3	35	0
3	34	2	5	31	1
4	62	8	0	63	0
5	31	3	5	28	0
6	29	3	4	34	1
TOTALS	249	25	21	217	2

* $p < .05$

These data are summarized below

Grade 1 Significant differences favoring the experimental group on Productive Thinking I & II, Forecasting, and Communication III

Grade 2 Significant differences favoring the experimental group on Productive Thinking I & II, Forecasting, and Communication I & III

Grade 3 Significant differences favoring the experimental on Planning and Forecasting The control group was significantly better on Communication III

Grade 4: Experimentals were significantly better than the controls on eight talent tests

Grade 5: Planning and Productive Thinking I and II were the significant talent areas for the experimental group

Grade 6: Significant experimental results were obtained on the Planning, Productive Thinking II and Communication II subtests, while the control group was significantly better on Communication I

At the end of year three of the original research, the ten subtests of the revised Criterion Referenced Tests were administered to experimental and control groups in grades 2-5 The Productive Thinking tasks were enlarged from two subtests to four which were entitled Flexibility/Imagination, Flexibility/Problem Solving, Originality/Imagination, and Originality/Problem Solving Results of the comparisons between experimental and controls are summarized in Table C

Table C
Comparison of CRT Results for All Talents at All Grade Levels End of 1973-74

	Number of Tests 1973	Number of Tests 1974
Significant Favoring Experimental*	25	32
Non-Significant Difference between Experimental & Control	21	8
Significant Favoring Control*	2	0

*$p<.05$

A summary of these data indicated that Talents students continued to improve their performance over the control group, therefore the revised test was more sensitive to the effects of participation in Talents training Gains made by the experimental group exceeded those in the control group with these grade level differences:

- **Grades two/three** showed a significant difference on all ten Talents tests
- **Grade four** showed a significant difference on seven of the ten Talents tests
- **Grade five** showed a significant difference on five of the ten Talent tests with the other five being non-significant

No differences favored the control group at any grade level In 1974, of the forty tests administered, participating Talents students exceeded control students on 32 of the 40 tests

2. Replication Studies 1979-80

During the 1979-80 school year, seventeen adopting school systems agreed to participate in an impact study of Talents Unlimited. The adoptees were asked for pre and posttest data from at least one Talent area. Complete data were not received from several systems which originally agreed to participate. Most systems not returning complete data lacked posttest scores. One of the adopters was excluded because it was determined that the posttest data were collected under conditions considered by the evaluators to be invalid. Seven sites reported complete data for both experimental and control groups. Table D outlines descriptive information on each site, grades and tests administered.

Table D
Descriptive Information of Seven School Sites Reporting Complete Data

Site	Grade	Talent Tested
Lake Village, Arkansas	1 - 6	Productive Thinking/Flexibility Productive Thinking/Originality Forecasting Decision Making Planning
Little Falls, New York	4	Decision Making
Homer, Alaska	1 & 3	Forecasting
San Antonio, Texas	4	Forecasting
McAllen, Texas	4	Productive Thinking/Flexibility Productive Thinking/Originality
Kentwood, Michigan	5	Planning
Cache County, Utah	5	Planning

Table E provides a summary of experimental results from the seven adoption sites that are included in this report. As you can see, these results support the validity of the Talents Unlimited program. All of the various studies favored the TU experimental group. In addition, data were included from all five talent areas, grades one through six, and all areas of the country. This further underscores the program's replicability and flexibility in terms of adopting site as well as curriculum.

Table E
Summary Table for All 7 Adoption Sites Included in this Report

Site	Grade	Talent	Test Statistic	Level of Significance
Lake Village, AR	1	Productive Thinking (Flexibility)	t = .40	NS
Lake Village, AR	1	Productive Thinking (Originality)	t = 4.10*	$p < .001$
Lake Village, AR	2	Communication (Behavior 3)	t = 6.52*	$p < .001$
Lake Village, AR	2	Communication (Behavior 5)	t = 1.61	NS
Lake Village, AR	5	Forecasting	t = 4.38*	$p < .001$
Lake Village, AR	3	Planning	$x^2 = 20.43$	$p < .001$
Lake Village, AR	4	Planning	$x^2 = 56.66$	$p < .001$
Lake Village, AR	6	Decision Making	$x^2 = 2.61$	NS
Little Falls, NY	4	Decision Making	$x^2 = 21.487$	$p < .001$
Homer, AK	1	Forecasting	t = 2.23*	$p < .05$
Homer, AK	3	Forecasting	t = 1.195	NS
San Antonio, TX	4	Forecasting	t = 4.14*	$p < .001$
McAllen, TX	4	Productive Thinking (Flexibility)	t = 14.03*	$p < .001$
McAllen, TX	4	Productive Thinking (Originality)	t = 23.47*	$p < .001$
Kentwood, MI	5	Planning	$x^2 = 36.48$	$p < .001$
Cache County, UT	5	Planning	$x^2 = 19.01$	$p < .001$

Critical x^2 (.10, 1) = 2.71

3. Recent Studies

Although the success of Talents has been strongly supported by the Criterion Referenced Tests, several factors have influenced the project staff to explore other measures of student/class progress. The enormous impact of the program on teachers as well as students over its sixteen-year history has made it more and more difficult to find a truly uncontaminated population for research. The success of the model in one school within a system or community invariably leads to Talents training for many, similar schools in the area/state.

In addition, a great deal has been written/published about the model. In the ERIC database alone, more than 1,000 references to Talents Unlimited can be found. Recent articles in periodicals such as the Roeper Review, Educational Leadership, Journal of Gifted Education and others have drawn attention to both the success of the model and the pressing need for training children to think creatively and critically. In the February issue of Learning, "Building Better Thinkers," Talents was included as one of the top ten thinking skills models in the nation, affecting more students than any of the other programs cited. Locating professional educators willing to participate as controls who have not been exposed to this wave of information has been difficult.

Since 1987, eight sites have used the CRT's to measure student gain in talent ability from pre to posttest without a control group. For example, a study done in Benton, Arkansas from 1986-88 with 95 elementary students revealed that 75% of the students tested showed gain in Productive Thinking and 66% of the students indicated improvement in Decision Making, the other talent tested.

Another factor which influences this collection of appropriate evaluation data is the district-level decision making process regarding staff development. Typically, districts plan for professional development on a semester by semester basis or, at best, a yearly basis. A theme of staff development from one year is not likely to be carried over into a second year in spite of substantial research (Joyce & Showers, 1980) on the importance of monitoring and coaching instructional innovation. The success of Talents Unlimited in changing students' thinking behaviors is predicated on substantial guided practice for at least a year and a half (Clarie, 1990). Commitment to long term staff development is essential but difficult to achieve.

Money has also limited the use of the Criterion Referenced Tests, the most effective evaluation procedure. In an effort to ease funding crunches, school systems are less likely to conduct replication research on a proven program such as Talents Unlimited. The precise documentation of the success of Talents in the reports cited above has been affirmation enough to convince many frugal districts looking to enrich their curriculum.

Exceptions to this generalization are programs specifically funded for special student populations, such as Chapter 1, where administrators are interested in quantifying Talents success within the identified student population.

Such is the case in the study on the following page. In the Jordan City School District, Sandy, Utah, experimental and control groups were drawn from Chapter 1 populations at two similar schools during the 1989-90 school year. Both groups were pre and posttested using the Productive Thinking/Imaginary and Productive Thinking/Solving CRT's. As evidenced by Table F the experimental group outscored the control at the .01 level of significance for grades one and two tested.

Table F
Summary of t-values on CRT's Comparing Control/Experimental Groups-Chapter 1
Jordan City School District, Sandy, Utah

Grade 1

	N	± Diff. In Score	S.D.	t	Effect Size
Imaginary/Flexibility					
TU	45	4.56	6.78	2.88*	.59*
Control	49	.53	4.21		
Imaginary/Originality					
TU	45	11.04	18.24	3.91*	.77
Control	19	-3.05	10.32		
Problem Solving/Flexibility					
TU	46	3.13	2.01	4.41*	1.10*
Control	23	.91	1.95		
Problem Solving/Originality					
TU	23	3.70	5.72	3.70*	.89*
Control	46	-1.39	5.02		

Grade 2

	N	± Diff. In Score	S.D.	t	Effect Size
Imaginary/Flexibility					
TU	16	4.88	5.15	-3.42*	1.54*
Control	7	-3.29	5.31		
Imaginary/Originality					
TU	16	6.94	11.87	3.48*	1.54*
Control	8	-13.00	12.94		
Problem Solving/Flexibility					
TU	16	3.25	2.93	1.01	
Control	8	-13.00	1.30		
Problem Solving/Originality					
TU	16	6.81	8.30	3.17*	.93*
Control	8	-.88	3.56		

*Effect size is the difference between TU gain and control gain divided by larger standard deviation. Significant effect size is determined by a value greater than .5.

It is also noteworthy that the experimental group of Chapter 1 students who took the 1982 Stanford Achievement Test also experienced an average NCE gain of 7.2 for this school year

Talents is also focusing on other special populations such as minority and at risk students. In research now being conducted by the Dallas Independent School District, Dallas, Texas, information is being collected to assist in norming the CRT's for specific minority groups. In a similar vein, Dr Nancy Peck, director of the Miami Desegregation Center and Executive Board Member for the National Dropout Prevention Center, highly endorses Talents as a method for identifying disadvantaged gifted youngsters.

In an effort to simplify the evaluation of student progress in Talents, while at the same time offering substantive data on total class progress, current leadership personnel have designed an instrument which has been successful and efficient (see Appendix V). The ten-minute Productive Thinking/Imaginary lesson which is administered by the regular classroom teacher, is scripted to include a process warm-up strategy with reference to the specific thinking that will be expected. In this total group activity, student responses are recorded on a cassette tape to be transcribed and submitted to a certified scorer for analysis of fluency, flexibility, and originality. Testing done at experimental/control sites in Torrington, Connecticut; Beloit, Wisconsin; and St. Petersburg, Florida reveals a marked increase in scores of Talents-trained classes over similar control groups. This innovative measure of the program's progress within a specific district/school has been an efficient gauge of the program's success in a classroom setting.

National and international interest in Talents continues to mount. International inquiries from countries such as Canada, Germany, Egypt and most recently Saudi Arabia lend credence to the program's popularity and success. Talents adoptions at over two thousand sites within the United States make TU one of the, if not the, most popular program in the National Diffusion Network.

Talents has also found its niche in teacher preparation curricula. A recent survey conducted through the Certified Trainer Newsletter revealed that Talents is addressed in courses taught at 41 colleges and universities. Additionally, it is included in many undergraduate and graduate education textbooks.

C. Interpretation and Discussion of Results

The battery of ten Criterion Referenced Tests is a valid measure of the nineteen specific thinking tasks which make up the Talents Unlimited model. Data presented above indicate that teacher and student training in these processes can enhance student performance in these specific skills.

Through careful, deliberate project design most rival hypotheses are overcome. Use of comparative control groups in most instances and different scores for pre and posttests were intended to control most rival hypotheses. The multiplicity of formal studies and adopter data across a range of sites argues for the reality of effect.

D. Educational Significance of Results

These results demonstrate the effectiveness of the Talents model in producing significant gain in these specific Talent behaviors. Both over a time and across replicated sites, Talents has repeatedly been a valuable, effective tool for teaching thinking skills within the curriculum. Moreover, its effectiveness is not limited by varying ethnic, racial or economic factors.

Although there are other cognitive skill development programs, none addresses instruction of higher level thinking skills with the same focus as the Talents model. Talents Unlimited targets staff development as the powerful key to address thinking skills within any established curriculum in a regular classroom setting. Thousands of workshop participants have indicated on evaluations that Talents training has had a significant positive effect on their ability to infuse the teaching of creative/critical thinking skills into the academic curriculum. Rather than investment in kits or equipment, Talents, then, is an investment in teachers. This philosophical uniqueness is a cornerstone of Talents long lived success.

Talents develops critical and creative thinking within the parameters of a manageable number of skills. According to Reis (1990) "introducing many thinking skills haphazardly at various grade levels does little to change how students think." The five research-based processes which comprise the Talents program are broad enough to offer an enormous range of implementation opportunities in combination with the Academic Talent. At the same time, they offer students at all grade levels reasonable strategies which act as vehicles for independent thinking.

Proficiency in these creative and critical thinking skills will enhance students' abilities to achieve the "National Goals for Education" as well as to address the problem solving demands of business and personal situations. In addition, Talents offers teachers a professional tool to attend realistically to the challenges of educating future leaders.

In summary, Talent responds to the immediate concerns of America's government, business and public by offering a practical plan to prepare our students to be better thinkers. Talents embodies the philosophy of millions of Americans and Louis V. Gerstner, CEO RJR/Nabisco, "We need to adopt that famous Noah Principle: No more prizes for predicting rain. Prizes only for building arks" (Doyle, 1989).

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Appendixes

Appendix I	**Sample Teacher in Training Activities**
Appendix II	**Sample “Kid Talk”**
Appendix III	**Sample Talent Activity Packet pages**
Appendix IV	**Sample Criterion Referenced Test Productive Thinking Imaginary Form B**
Appendix V	**Sample Total Class Assessment Item**
Appendix VI	**Sample Newsletter**
Appendix VII	**Sample Reactor**

Appendix I

Sample Teacher in Training Activities

Talents Unlimited Training Program

This Represents the Scope of the Basic Talents Unlimited Training Sequence

WORKSHOP ACTIVITIES

Participate in "Getting to Know You" and Orientation Session.

Participate in gathering baseline data using the "Talent Reactor."

Participate in input/discussion on multiple talent theory and practice.

Complete programmed booklet, "Rationale Revue."

Participate in input/discussion on:

1. Lesson plan variables
2. Introducing students to the multiple talent concept
3. Productive Thinking talent behaviors, exemplary activities

Participate in input/discussion on Productive Thinking talent; behaviors, exemplary activities, critiquing a Productive Thinking lesson plan.

Write a Productive Thinking activity in one curriculum area.

Participate in viewing and critiquing a videotaped Productive Thinking classroom demonstration.

Participate in input/discussion on Communication talent: behaviors, exemplary activities, critiquing a Communication lesson plan.

Write a Communication activity using one of the six behaviors in one curriculum area.

Have the Communication lesson plan critiqued by a talent specialist.

Participate in viewing and critiquing a videotaped Communication classroom demonstration.

Participate in input/discussion on Forecasting talent: behaviors, exemplary activities, critiquing a Forecasting lesson plan.

Write a Forecasting activity using one of the six behaviors in one curriculum area.

Have the Forecasting lesson plan critiqued by a talent specialist.

Participate in viewing and critiquing a videotaped Forecasting classroom demonstration.

Participate in input/discussion on Decision Making talent: behaviors, exemplary activities, critiquing a Decision Making lesson plan.

Write a Decision Making activity in one curriculum area.

Have the Decision Making lesson plan critiqued by a talent specialist.

Participate in viewing and critiquing a videotaped Decision Making classroom demonstration.

Participate in input/discussion on Planning talent: behaviors, exemplary activities, critiquing a Planning lesson plan.

Write a Planning activity in one curriculum area.

Have the Planning lesson plan critiqued by a talent specialist.

Participate in viewing and critiquing a videotaped Planning classroom demonstration.

Participate in Tag-A-Talent session.

Participate in viewing slide tape presentation "Talents-by-the-Week."

Put a talent training year on a time line including pre and post testing of students.

Complete an evaluation form for the practicum.

Appendix II
Sample "Kid Talk"

KID TALK

Productive Thinking

1. Think of many ideas.
2. Think of varied ideas
3. Think of unusual ideas.
4. Add to your ideas to make them better.

Forecasting

1. Make many, varied predictions about the causes of a situation.
2. Make many, varied predictions about the effects of a situation.

Communication

1. Give many, varied single words to describe something.
2. Give many, varied single words to describe someone's/something's feelings.
3. Think of many, varied comparisons in the form of a simile.
4. Let others know that you understand how they feel by sharing a personal experience.
5. Make a network of ideas using many, varied complete thoughts in oral or written language.
6. Show your feelings, thoughts and needs without using words.

Planning

1. Think of what you are going to plan so someone will know what your project is.
2. Think of all the materials and equipment you will need for your project.
3. Think of all the steps needed to complete the project and put the steps in order.
4. Think of any problems that could keep you from completing the project.
5. Think of ways to improve your plan.

Decision Making

1. Think of many, varied things you could do.	ALTERNATIVES
2. Think of the varied questions you need to ask about these things you could do.	CRITERIA
3. Use your answers to help you make a decision.	WEIGHING
4. State your final decision.	DECISION
5. Give many, varied reasons for your decision.	REASONS

Appendix III
Sample Talent Activity Packet pages

A Sign-In

Motivation: Show the "Symbol City, U.S.A." poster #3 from Learning magazine, Vol. 1, No. 2 (or use pictures of a variety of signs commonly used in your community). Guide children in identifying the many ways symbols are substituted for words. Using examples from the poster, help them see that while some symbols clearly convey a certain meaning, because they look like what they represent, that other symbols must be learned. Point out the stop sign as an example of a symbol whose meaning must be learned through its color, shape, and the word "Stop." Ask the youngsters to take a few minutes to brainstorm many, different, unusual symbols which could be used to convey the idea of "Stop" (e.g., a raised hand, a picture of a car screeching to a halt).

Teacher Talk: Say: "There are many other symbols we use every day for which we have to learn the meaning. For example, in math we use the "+" sign to show that numbers are to be added, a "-" to show that numbers are to be subtracted, etc. Some people feel that there may be better and more interesting ways to tell what is to be done. Let's create some new and different symbols which show how to add, subtract, multiply, and divide. Think of ideas which are clever and yet can be understood."

Student response: To get quality in student responses, this activity may require more than one period and perhaps some research time in the library. As an example of creative take-home work, it suggests high involvement in talking with other members of the family and people in the community. All four productive thinking processes will be in operation.

Reinforcement: As youngsters share their new ideas, offer liberal praise for fluency, flexibility, and originality and elaboration. Perhaps your class will suggest using one or more of the symbols in a trial situation for math class.

Body English

Motivation: Read the story "The Three Little Pigs" to the class and have a group of children dramatize the story using some of the words that were spoken by the characters in the story, as well as their own words as they give their own interpretation to the scenes.

Then tell the class that sometimes we use the words to get our own thoughts and ideas over to others, and sometimes we can let others know our feelings and ideas without using words, by "acting out" our ideas and feelings; by using different body movements, facial expressions, and gestures.

Now have several children act out the story without using words.

After you are sure the children are warmed up to the process of nonverbal communication, then move into the main activity and have them react verbally to their like or dislike of spaghetti as a food.

Teacher Talk: Tell the children to pretend that they are each a box of spaghetti and without using words to show how they would be in each of the following situations:

1. Being taken out of the box
2. Uncooked on the kitchen counter
3. Put into a pot of water that's boiling
4. As cooked spaghetti
5. Being eaten

Student Response: The children will need room as they react to each situation.

Perhaps having them in five groups with one group responding to one of the five situations while the others are spectators would be a solution to the space problem, while still allowing each child to be spaghetti as he demonstrates many different forms of nonverbal communication.

Reinforcement: Praise the class for expressing their many different ideas and feelings without using words.

I Wonder Why
(to accompany fifth grade social studies unit, "Colonization and the Revolutionary Period," Main Idea I)

Motivation:	Review the written accounts of the "Lost Colony" in texts used by your class. Help the youngsters understand that we do not know what actually happened there in 1585 but that we can use our forecasting talent to predict the causes for the disappearance of the colony (the effects). Help youngsters to see that they are really predicting causes for an effect. Work for many different causes, relating ideas to facts whenever possible.
Teacher Talk:	Say: "Like you, some historians have guessed that one possible cause for the disappearance of the colony was related to the Indians who lived in the area of the settlement. You know, all through the colonization period we are learning that the Indians and colonists did not always live together peaceably (effect). I want you to think of as many different things (causes) as you can which might explain why some Indians and some colonists had difficulties in living together and often seemed afraid of each other."
Student Response:	Be careful to build the necessary vocabulary (cause and effect) as you encourage youngsters to work for many different explanations.
Reinforcement:	Offer praise for the number and different kinds of causes given to explain the effect. Be especially reinforcing when youngsters dig deeper to get at underlying causes and causes involving feeling.

Be Your Own Designer
(to accompany the third grade unit, "Clothing")

Motivation: Have each child use the planning behaviors to plan and draw a picture of the season. Ask them to include at least one person in their picture. Display all pictures on a bulletin board. Show and discuss filmstrip G-119, "Clothing for All Seasons."

Teacher Talk: Say "Now you should be very much aware of the kinds of clothing suitable for each season. Remember too, earlier in the unit you learned that clothing is made from many kinds of materials, and styles of clothing are chosen from the pictures done by the designers. The pattern is made, and the garment is ready to be cut and sewn."

Student Response: Assist students with any problems they have while filling out the planning worksheet. Allow them to fill the sheet out in random order if they so desire, as long as they use all the behaviors in planning.

Reinforcement: Praise planning efforts of students as they work through the planning behaviors. Some of the children might want to design paper doll clothes which are suitable to be worn during the four seasons.

Below is a model of the worksheet which includes all of the planning behaviors:

Be Your Own Designer

1. Name or tell what you want to make/design. Draw a picture of your garment on the back of this paper.

____

2. List the materials you will need.

____________ ____________ ____________

____________ ____________ ____________

3. Tell how you are going to make what you have chosen to make.

Step 1: ________________________________
Step 2: ________________________________
Step 3: ________________________________
Step 4: ________________________________

4. List problems you might have.

____

Appendix IV
Sample Criterion Referenced Test
Productive Thinking Imaginary Form B

Productive Thinking
(Imaginary)
Form B

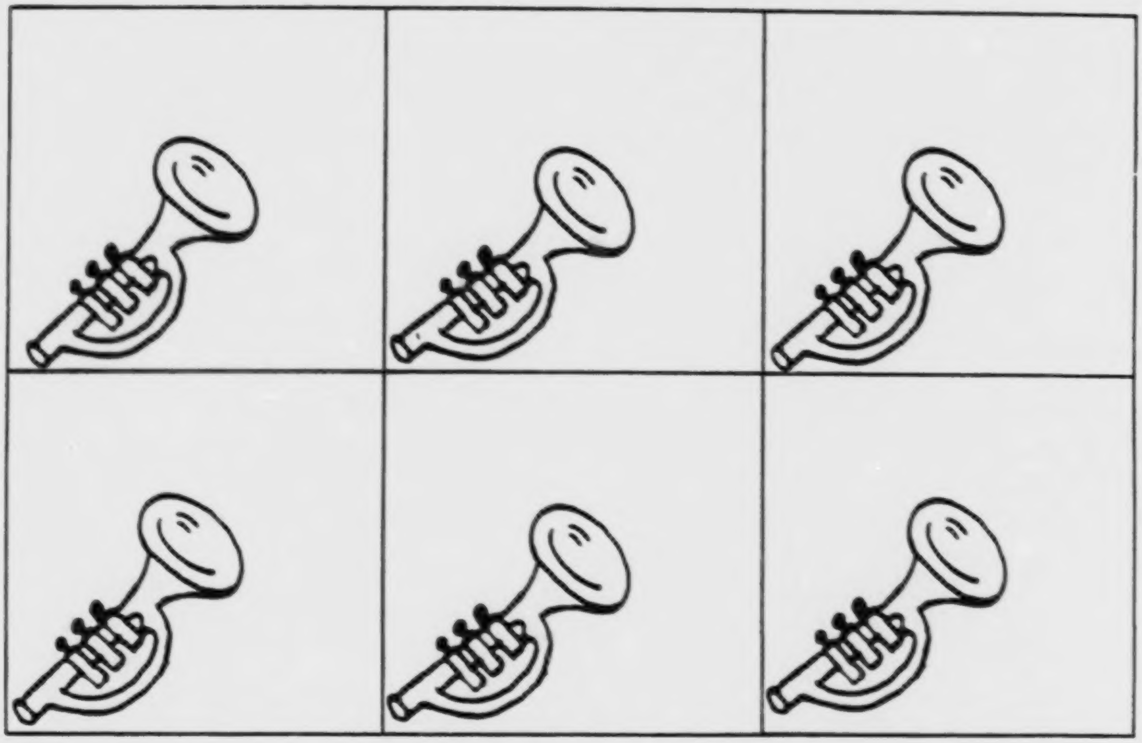
Intermediate

In this activity you will be asked to think of many, different, unusual ideas. Let your imagination fly as you think of things no one else would think of.

Let's use our imagination together right now for just a few minutes. Look at the row of pictures next to the arrow at the top of your booklet, as you listen to the story I will read.

Pretend that your mother has asked you to clean out the garage. There are many things in the garage. One of the things you find is an old horn. You pick it up and blow it.

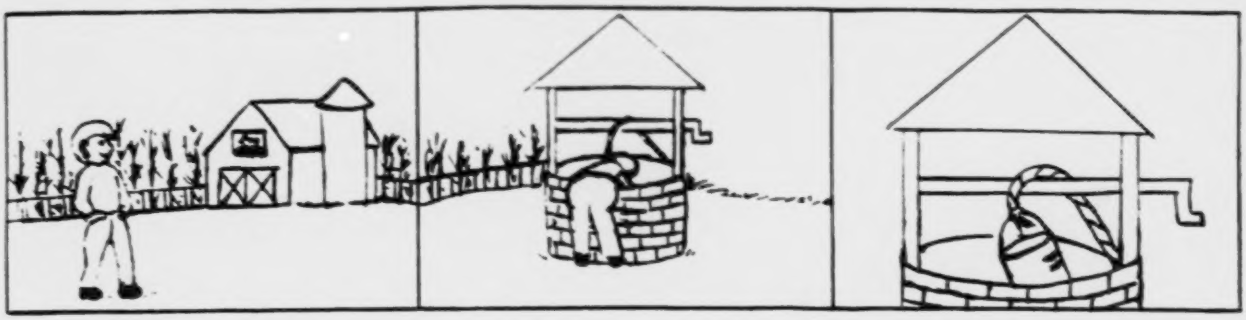
Usually, only music comes out of the horn. But there are some unusual things that could come out of this horn -- things that could surprise you; for example, a bird's nest or a witch could come out of the horn. I want you to draw the witch coming out of the horn in the first box at the bottom of the page. Write a name for your picture in the box.



STOP **WAIT FOR THE SIGNAL TO GO ON.**

Now you are going to be asked to think of many, different, unusual ideas for a new activity You will be thinking of ideas that are new and different from the ones we have talked about together Look at the row of pictures next to the arrow at the top of the page, as you listen to the story I will read

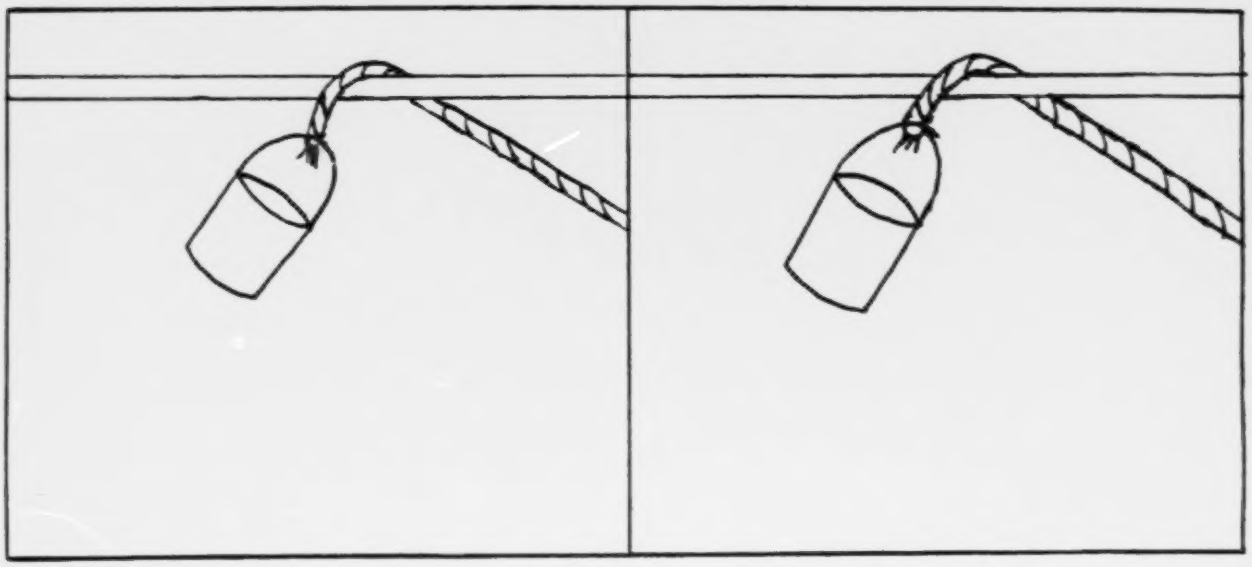
⇨



Pretend that you are visiting friends on a farm. One day as you are exploring the farm, you find an old well. You let the bucket down on its rope and, then, you begin to pull it up.

Usually, you would expect to find water in the bucket. But you could be surprised at what is in the bucket you pull up. Think of al the unusual things, besides water, that you could get from the well. Draw as many different ideas as you can think of in the boxes below and on the next 6 pages. Try to think of things no one else will think of. Let your imagination fly.

⇨



Appendix V

Sample Total Class Assessment Item

Mobile County Public Schools

BOARD OF SCHOOL COMMISSIONERS OF MOBILE COUNTY

SCHOOL BOARD COMMISSIONERS
Robert W Gilliard, DDS, President
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Norman C Cox, Lt Col (Ret)
Marion P Warren

SUPERINTENDENT
Billy D Saiter

TALENTS UNLIMITED
A Divergent Thinking Skills Model
1107 Arlington St.
Mobile, AL 36605
(205) 690-8060

October 1, 1990

Dear Teacher,

Thank you for agreeing to take time to participate in our research.

Below you will find a script for a ten minute activity to be done orally with your entire class. Please transcribe their exact responses on the attached form. Please involve your class in this activity before lunch on a relatively routine day.

Say: " Today we will do an activity relating to the fall season. We will be using our productive thinking talent as we do this activity. When we use our productive thinking talent we think of many ideas, varied ideas, unusual ideas and we add to our ideas to make them better.

Pretend we have walked in the woods and have enjoyed seeing the trees with their colorful leaves. Ordinarily, leaves fall from trees at this time of year. Using your productive thinking talent think of many, varied, unusual things besides leaves which could fall from trees. Some of these things could be surprising. Let your imagination fly! We will record your responses for ten minutes on the tape, so speak clearly and one at a time."

I truly appreciate your participation.

Sincerely,

Brenda Haskew
Director
Talents Unlimited

School Data Sheet

School Name Forbes School
Address 500 Migeon Avenue
Torrington, CT 06790
School Phone 203-459-2500
School District Torrington
Principal's Name Miss Radocchio

Research Data:
Control
Experimental ✓

Urban ✓
Suburban
Rural

RECEIVED
OCT 29 [illegible]
TALENTS UNLIMITED

School's Student Population Information:

Student Enrollment 204

% Minority Students: 0% - 25% ✓
26% - 50%
51% +

Student Minorities Served: Black, Asian, Indian (Am)
Hispanic

% of students participating in free/reduced lunch program
0% - 25%
26% - 50% ✓
51% +

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TALENTS UNLIMITED
MOBILE, ALABAMA

Class Data Sheet

School Forbes
Grade Level 3
Teacher Nancy Mencuccni
# of Students in Class 20
Date of Activity October 15, 1990

Transcript of Student Responses for the Productive Thinking Activity:

1. acorns
2. bugs
3. pine cones
4. pumpkins
5. gum balls
6. coconuts
7. money
8. branches
9. books
10. bananas
11. bird nests
12. paper
13. apples
14. people
15. slime
16. ghosts
17. teddy bears
18. candy
19. clothes
20. gumdrops
21. rocks, boulders
22. grass
23. animals
24. branches
25. stars
26. hats
27. diamonds
28. scarecrows
29. Africa
30. trees
31. cats
32. squirrels
33. caterpillars
34. wood
35. cotton-candy
36. popcorn
37. snow
38. clothing
39. rings
40. cocoons
41. rain
42. The blob
43. a chest
44. a shoe
45. earrings
46. socks
47. all the United States
48. continents of the world
49. candy canes
50. ornaments
51. the Universe
52. woolly bears
53. markers
54. crayons
55. accessories like necklaces
56. bears
57. barrels full of apple cider
58. lava
59. erasers
60. snakes
61. chalk
62. meteorites
63. brains
64. teachers
65. goblins
66. bark
67. chocolate bars
68. candy apples
69. balls
70. armor
71. witches
72. friends
73. pizza
74. chocolate covered cherries and apples
75. dishes of ravioli
76. strawberries
77. penny candy
78. Halloween
79. squirrels
80. broom
81. Talents
82. Leprechauns
83. possums
84. Draculas
85. food
86. mummies
87. ice cream cones
88. schools
89. pots of gold
90. cake

Class Data Sheet - Continued FORBES SCHOOL - Grade Level 3

91. clocks
92. ghosts
93. cookies
94. timers
95. the invasions of meatballs
96. donuts
97. bats
98. starships
99. glasses of chocolate milk
100. pencils
101. tape recorders
102. muddy pigs
103. cam-corders
104. tv sets
105. the moon
106. Chainsaw massacre
107. space invaders
108. goblins
109. Freddy
110. watches
111. cheese
112. fireballs
113. rope
114. ghouls
115. spirits
116. paper cuts
117. jelly beans
118. owls
119. spiders
120. a boat

Appendix VI
Sample Newsletter

Talents Unlimited CT Newsletter

Volume 10 - Number 1 September 1990

A "World Class " Conference

The TALENTS UNLIMITED 1990 Conference in New Orleans, Louisiana was truly a "World Class" celebration of student and professional accomplishment and potential. One hundred and three educators representing 21 states were in attendance.

Following registration on Wednesday, July 11, a reception was held in the La Nouvelle Room of the Monteleone Hotel.

Thursday morning's general session opened with greetings from Mrs. Anne Taylor, Coordinator of Staff Development for the Mobile County Public School System. Dr. Debbie Hobbs, former director of TU, addressed conference participants and formally passed the mantle of directorship of TALENTS to Mrs. Brenda Haskew. Debbie then introduced the keynote speakers Mrs. Sherrin Gillen and Mrs. Patti Hughes, both Talents classroom teachers. Their topic "Loving to Learn - Our Incredible Journey" highlighted both their nationally-recognized collaborative learning program, Beaver Buddies, and a personal journey toward professional excellence through TALENTS. The general session closed with the introduction of the presenters and their topics for the small group sessions.

The Certified Trainer's Luncheon immediately followed the general session in the D'Iberville Room of the Monteleone.

Throughout the conference the Hall of Talents was open to showcase the displays of Talents National Demonstration Sites. Most notably represented was the display prepared by the staff at Forbes School in Torrington, Connecticut. Principal Jo Radocchio, ably assisted by Camille Radocchio, Nancy Mencuccini, Sylvia Lovley and Ann Vitali, presented wonderful examples of the creative efforts of teachers and children through the use of the TALENTS model. Their participation set a standard of excellence for future Hall of Talents exhibits.

Thursday afternoon's small group sessions featured Dr. Carol Schlichter, the original project director and current chair of the gifted department at the University of Alabama, who addressed "Digging Deeper with Talents: Working with the Gifted." Sherrin Gillen and Patti Hughes related "The 'How To' of Beaver Buddies." Beverly Flaten from Montana spoke concerning "Connections: Weaving Educational Process Together with Exciting Talents Strategies." "Talents in Special Education" was addressed by New York CT June Silberman while Montana's Alicia Duncan encouraged participants to "Keep the Plates Spinning: Talents in the Middle School." Additionally, Sara Waldrop, an original project team member, addressed "Strategies for Informal Evaluation of Student's Work." Susie Flentie from Montana presented "An Investigation of the Effects of TALENTS UNLIMITED on Student Writing Skills" and Connecticut's Jo Radocchio presented "Implementing Talents in the Total School." Utah State's

Dr. Debbie Hobbs addressed strategies to "Enhance Process Writing with Talents" while Dr. Zemula Bjork from the University of South Alabama cited "Head Start Experiments with Talents."

Thursday evening was one of discovery and delight as conference participants explored the French Quarter's culinary and cultural specialties.

Friday's small group sessions highlighted Tennessee's Sally Thompson with the provocative "Talents, Tennessee, and the Three-ics: Using Talents to Develop Geographic, Sociologic and Ecologic Awareness." Pat Thomas from New Mexico presented "Talents to Inventions" and Montana's Tammy Lacey addressed "Talented Themes." Ohio's Connie Donovan rounded out the program offerings with "Strategies for District-wide Implementation K-12."

A banquet was held on Friday evening in the Queen Anne Room of the Monteleone. This gathering was enhanced by the skill of piano soloist, Iowa's CT Diane Wirtz. Following delicious New Orleans cuisine, Director Brenda Haskew presented plaques of appreciation to Sara Waldrop and Debbie Hobbs for their unique contribution to the TALENTS UNLIMITED model. Plaques of appreciation were also sent to Carol Schlicter and Calvin W. Taylor for their pioneering work. All conference participants received marble paperweights emblazoned with TU 1990 to remember this "World Class" experience.

Saturday morning's breakfast buffet in the La Nouvelle Orleans Room brought old and new friends together for a last good-bye and an exchange of addresses. Promises were made to meet again to celebrate Talents and Mardi Gras in Mobile in 1992.

CERTIFIED TRAINER OBSERVATIONS
BY
CAROL BELLI
NATIONAL CERTIFIED TRAINER

From my point of view, the 1990 TALENTS UNLIMITED Conference in New Orleans was extraordinary success. Unquestionably what impressed me the most was the superb caliber of the presenters and the significant value of each of the presentations I personally attended. In addition, the sessions I was forced to miss due to scheduling conflicts were reported by other trainers to be equally as informative and useful. Your selection process was faultless. The entire conference was well organized. I look forward with great anticipation to the next conference in Mobile.

NOTES FROM THE DIRECTOR

One of the premier events of the TALENTS UNLIMITED National Conference this summer was the Certified Trainers' Luncheon. On Thursday, July 12, about 65 Talents trainers from across the nation met in the elegant D'Iberville Room of the Monteleone Hotel for a delicious serving of Chicken Maquechoux and TALENTS.

Current certificates were distributed to all who had successfully negotitated the re-certification process and; as new director, I commented on several items I feel to be immediately important for this model.

In a nutshell, here are the points I emphasized:

1. Communication - This relates to information sent from this office and information sent to this office.

As you well know, TALENTS UNLIMITED is a staff development model. One of the primary functions of the Mobile office must be to assist you, certified trainers, as you provide training and technical assistance to interested districts and schools. Obviously, you want to know what's new, and we want your presentation of Talents to be accurate and effective.

Expect to see this newsletter from Mobile every September and March. In it you will find timely tips on new developments in Talents, trends and techniques that will make your presentation of TU even more effective and successful.

We are currently capturing in writing some ideas that have been traditionally passed along by word of mouth. For example, the "Criteria for TALENTS UNLIMITED National Demonstration Site" which is enclosed with this newsletter, was recorded by Dr. Debbie Hobbs and Sara Waldrop, former directors of Talents, and recently revised. It clearly states what is expected of a national demo site. Share this with candiate sites who may be willing to make this kind of commitment to TU.

In addition, you will find the notes from Faye, Talents secretary, and Rhea, Talents shipping, will be helpful to you as you communicate with this office. Some of you may not be aware that pre-packaged workshop materials can be shipped directly from TU Mobile to your workshop site.

Call Rhea at (205) 433-7610 for details on how these materials can be ordered.

Please feel free to call the office anytime, however, we must hear from you regularly as you do initial training and technical assistance. Your monthly report of activities should include all pertinent information on Talents work you have done within that reporting period. Don't forget to include the number of your technical assistance hours using this formula for group sessions: Number of hours x number of people = Total TA hours.

2. Development of Materials - This relates to materials developed/revised by Mobile and materials that you are developing.

Bear in mind as you create and share thematic materials using the Talent's language that only teachers who are Talent trained will truly understand the lessons you have written. TU activities are understandably valuable for all students; however, only students of a Talents teacher will receive maximum benefit from the lessons through deliberate inclusion of the metacognitive component.

As for materials available through this office, revisions have begun and will continue as quickly as possible. Please know that we recognize a need for updating TAP's, TNT's, videos (!), awareness materials, etc. We will keep you informed of developments in this area.

3. Recertification of Trainers - Although plans remain for this procedure to be conducted on a biennial (every two years) basis, there will be changes in the instrument(s) for recertifying as a trainer for Talents. After sixteen years, I fear some of you have memorized the "Reactor"!

In all fairness to you and to maintain the integrity of the model, we will revamp forms to be sent out every other March and request they be returned within approximately eight weeks. Remember, however, that consistent data compilation forms reporting your training/technical assistance continue to be a part of recertification. Each report, letter, etc, that deals with your training/TA, is examined and filed in your personal CT folder in this office. As Certified Trainers you are the critical element in this model's implementation. Much of this model's sixteen year history of success has been due to your perseverance, intelligence and integrity.

DID YOU KNOW?

Talents has been featured in these recent publications:

- Educational Leadership (April, 1988), p. 35-40.
- Learning (February, 1990), p. 51-55
- Journal for the Education of the Gifted. Vol. 13, No 2 (Winter, 1990) p. 156-166.
- Systems and Models for Developing Programs for the Gifted and Talented, ed Joseph S. Renzulli, (Creative Learning Press, Mansfield Center, Connecticut) 1986, p. 352-389.

Congratulations to Susan Lamar, National Certified Trainer for North Carolina. Susan recently received the Terry Stanford Award for Creativity in the Teaching of Thinking Skills in that state.

RSVP

We in the Mobile office need to know how creative educators across the United States are showcasing TU. Many of you have contacted us informally about the excellent work that you are doing. For example, we have copies of several formal papers written and submitted to colleges and universities in partial requirement for a high degree. Such information is invaluable to us as we gather data on Talents for publication and research.

Enclosed you will find two survey forms developed in an effort to gather data on facets of Talent dissemination. One refers to college/ university level courses relating to Talents and the other requests information on your Talents presentations to state, regional, or national groups since January, 1987.

Please consider these forms seriously. Complete and return the info pertinent to your work during this time. We are genuinely interested in documenting the scope of influence you have exerted/experienced through TU during these years. We will share the surveys' results in the March 1991 newsletter. In addition, please let us know of state, regional or national honors you have garnered as a result of your professional work.

Information gleaned from these surveys will also be used immediately in a re-validation study which will be submitted to Washington the last week in October. For this reason we ask that you return the form(s) that apply to you by October 15 or sooner. Thank you for your cooperation.

ADVANCE NOTICE
PLAN AHEAD
MARDI GRAS IN MOBILE - 1992

The next TALENTS UNLIMITED National Conference will be convened at the "Home of the Mardi Gras", Mobile, during that festive celebration. Plan to come on February 27 - March 1, 1992 to the Stouffer Riverview Plaza Hotel. Because the hotel is on the parade route, conference activities will be arranged to allow time for viewing all the parades scheduled for this weekend. If you are interested in staying after the conference thru Mardi Gras Day, Fat Tuesday, March 3, please call the Riverview ASAP. Rooms in downtown Mobile are scarce during this time of year. The number for reservations at the Riverview is 1-800-468-3571.

Appendix VII

Sample Reactor

RECERTIFICATION

CERTIFIED TRAINERS must be recertified every two years by the Mobile Staff.

Various factors are considered in the Recertification Process:

- Self-evaluation by the Trainer
- Reports of the work the Trainer has done for the year
- Feedback about the Trainer's work from workshop participants
- Attendance and participation in the Talents Unlimited National Conference
- Contributions to the Talents Unlimited Newsletter

Talents Unlimited

Talent Reactor

Name ______________________________

Sex ______________ Date ______________

Home Address ______________ Phone ______________

City ______________ State ______________ Zip ______________

Work Address ______________ Phone ______________

____

City ______________ State ______________ Zip ______________

College ______________________________

Grade Level Interest ______________________________

Methods Courses ______________________________

____

TALENT REACTOR

Multiple Choice

1 In the following list, check the talents identified by Dr Calvin Taylor in his multiple-talent rationale

☐ a) communication
☐ b) listening
☐ c) forecasting
☐ d) academic
☐ e) art
☐ f) music
☐ g) planning
☐ h) decision making
☐ i)dramatics
☐ j) productive thinking

2 In the following list of statements, check those that correctly describe Taylor's multiple talent rationale

☐a) nearly all kids are talented,

☐b) nine out of ten children will be above average in at least one of the talents,

☐c) there are several ways of being smart; the ways of being smart are related to the work-a-day world;

☐d) what is needed in education is development of creative and other high level talents in addition to a the customary talents displayed so well by the academically gifted;

☐e) each of the different talents can function in acquiring knowledge across all subject areas,

☐f) the fact that a person has attained an educational degree in the present system gives little assurance that he has all the necessary abilities for handling problems of the real world;

☐g) talent development is a complex process incorporating both cognitive, affective and psychomotor components;

☐h) All of the above statements;

☐I) none of the above statements,

☐j) only statements a, b, c;

☐k) only statements a, b

3 Check the following statements that define the main purpose of a student talent profile

☐a) to graphically describe the specific talents of an individual child;

☐b) to clarify talent areas which need nurturing,

☐c) to identify a student's areas of talents strengths,

☐d) to serve as an evaluative report for the cumulative

MATCHING

Match terms below with their definitions as you see them relating to this project. Place a letter from Column I in the space beside the correct definition in Column II.

Column I		**Column II**
A. Affective Domain	___	skills used in transforming knowledge in order to solve problems
B. Processes	___	a grouping of talents based upon world of work needs
C. Hierarchy of Skills	___	series of actions that bring about end results
D. Rationale	___	a general statement of philosophy or theory
E. Talents Totem Pole	___	describes changes in interest, attitudes and values and the development of appreciations and adequate adjustments
F. Cognitive Domain	___	concerns the recall of knowledge and the development of intellectual abilities
G. Multiple Talents		

This part of the Talent Reactor gives you an opportunity to express your own ideas about climate control factors.

Express your own ideas about classroom climate control factors. Using the following words, write a sentence which reflects your idea of a Talents classroom's learning environment.

Warm Reinforce Climate Control Rapport

DIRECTIONS: Read the behaviors listed below the table for Talents. Match behaviors with Talents by placing the numeral for each behavior in the correct box. Every Talents box will have at least one numeral. One of the boxes will have two numerals. As you record the numerals under each Talent, order them; e.g., Behavior Statement number 1 is Behavior 3 in Communication. It has already been recorded for you.

PRODUCTIVE THINKING	FORECASTING	DECISION MAKING	PLANNING	COMMUNICATION
				1

The student is

1. making comparisons by completing the simile "The web that Charlotte wove was as intricate as ___."
2. listing many, varied single words to describe the class hamster.
3. telling a personal experience when he/she felt like Edison when he first discovered the light bulb.
4. writing a haiku about an insect.
5. weighing his field trip possibilities in light of his criteria questions.
6. listing and sequencing his actions for constructing a sundial.
7. listing the materials he will need to complete his/her leaf print.
8. adding details to his unique design for his family crest.
9. drawing a unique classroom desk.
10. delivering a campaign speech for his candidacy for class president.
11. identifying his health project with enough detail to explain what he wants to do.
12. pantomiming the water cycle.
13. listing many, varied effects of the Mississippi River's pollution.
14. defending his choice among several healthy snacks by writing reasons for his choice.
15. listing alternatives to the problem of what to do about his flat bicycle tire.
16. using a different color pencil to make improvements to his plan for constructing a simple machine.
17. considering problems he may have in completing his handmade ring toss game.
18. listing many, varied single words to describe how Sutter felt when he first discovered gold in California.
19. suggesting many, varied causes for an oyster shell, an earthworm and a knife to be found together.
20. making his final choice of a Dr. Suess book to buy.
21. generating a set of questions to ask about the alternatives for his choice of a safe place to play.
22. listing a variety of uses for a bottle top.
23. drawing many things that could be found in a cave.

DIRECTIONS Evaluate the following talent activity lesson plan. Using the set of criteria in the checklist below, check the box to the right of each criterion that best reflects your judgement of the lesson plan.

GLIDING AND GLITTERING
(Forecasting)

MOTIVATION	Say: "Today we are going to leave our present shapes and become inanimate objects. (If necessary, explain the meaning of inanimate to your class.) Think first about the following situation, 'If you are a snowflake where are all the many different places you might land?'" Allow children time to think and then have them orally respond to the situation. Say: "Shift gears now to a warmer situation" and show a large picture of a neon sign. Remind the students of their current study of the Element Table in science. Have them discuss the properties of neon.
TEACHER TALK	Say: "What would it be like to be a neon sign? Write all the ways you think a neon light feels as it sits up here glittering on and off in many different colors."
STUDENT RESPONSE	Have student work for many different predictions. It may be necessary to ask questions which help the student realize that some answers are really one prediction.
REINFORCEMENT	Give praise for predictions which fall into different categories.

CRITERIA FOR EVALUATING TALENT ACTIVITY LESSON PLANS		
CRITERIA	YES	NO
1. Is there a match between the talent the activity is designated to be and the talent name/terms in motivation?		
2. Is the motivation related to the target behaviors?		
3. Is the teacher talk related to the target behaviors?		
4. Is the statement regarding student responses related to the target behaviors?		
5. Does the reinforcement variable relate to the target behaviors?		
6. Is there provision for a talent process warm-up?		
7. Does the plan include a situational warm-up?		
8. Does the plan include sufficient cue words?		
9. Does the plan tell you enough--is there sufficient elaboration?		

DIRECTIONS Choose one of the core ideas as a basis for developing each of the four variables for a talent activity

MOTIVATION

TEACHER TALK

CHOOSE ONE

What would you take with you from the new world as you return to Spain with Columbus?

Advertise a great thing to do in Alabama.

Needed new names for all the streets in the city.

The lady was waving her arms.

A picture shows a Native American crouching behind a tree.

The class is getting ready to go on a field trip.

Someone offers to give you a Saint Bernard puppy.

Recently a group of scientists and inventors met to think of ways for all nations to work together to increase the world's food supply.

Legends and myths have been created out of man's rich imagination since the beginning of time. Myths were created to explain nature and its mysterious ways.

Surprise is often created when things are combined that don't belong together. A man is looking out the window of an airplane. He seems startled . . .

STUDENT RESPONSE

REINFORCEMENT

DIRECTIONS: After reading the situation and the teacher/pupil dialogue below, respond to the situation as it relates to evaluation and reinforcement of the divergent talent behavior being demonstrated by the pupils.

The group is planning a Thanksgiving basket for a needy family. Their plans are recorded on the chalkboard (food items needed for a balanced meal, provisions of a container, transportation, any problems they might have, etc.)

Teacher "Is there anything else we might need to consider?"

Pupil #1 "I don't see any fruit on the list to use for the middle of the table."

Teacher (smiling) "You're thinking of the beauty of the table as well as the food." (**CLUE**: That's both nonverbal and verbal reinforcement.)

Pupil #2 "Ms. ________, what will happen if this family has company? Will there be enough food?"

Now you be the teacher and respond to Pupil #2's divergent question.

DIRECTIONS: As a teacher, rate the pairs of words below as they relate to the major concept. Make your ratings according to how you feel at this time.

EXAMPLE **Concept: Talent Development**

useless	☐☐☐☐☒	useful

For the concept, "Talents Development, this teacher felt that the word "useful" expressed her feeling better than the word "useless." (A neutral feeling would be represented by a check in a middle box.)

Concept: Talent Development

academic	☐☐☐☐☐	creative
incidental	☐☐☐☐☐	planned
few talents	☐☐☐☐☐	many talents
innate	☐☐☐☐☐	learned
imposed	☐☐☐☐☐	cooperative

Talent Development (continued):

fine arts	☐ ☐ ☐ ☐ ☐	practical arts
passive	☐ ☐ ☐ ☐ ☐	active
additional	☐ ☐ ☐ ☐ ☐	integral
insignificant	☐ ☐ ☐ ☐ ☐	significant
dilemma	☐ ☐ ☐ ☐ ☐	challenge
unwilling	☐ ☐ ☐ ☐ ☐	willing
unrewarding	☐ ☐ ☐ ☐ ☐	gratifying
cool	☐ ☐ ☐ ☐ ☐	warm
orderly	☐ ☐ ☐ ☐ ☐	chaotic

Ask yourself, "How do I perceive classroom environment as it relates to talent development?"

Concept: Talents Classroom Environment

unpleasant	☐ ☐ ☐ ☐ ☐	pleasant
passive	☐ ☐ ☐ ☐ ☐	active
closed	☐ ☐ ☐ ☐ ☐	open
dilemma	☐ ☐ ☐ ☐ ☐	challenge
insignificant	☐ ☐ ☐ ☐ ☐	significant
incidental	☐ ☐ ☐ ☐ ☐	planned
academic	☐ ☐ ☐ ☐ ☐	creative

cool	☐	☐	☐	☐	☐	warm
convergent	☐	☐	☐	☐	☐	divergent
inhibiting	☐	☐	☐	☐	☐	stimulating
hindering	☐	☐	☐	☐	☐	supportive
dull	☐	☐	☐	☐	☐	bright
discouraging	☐	☐	☐	☐	☐	encouraging

Concept: **Talents Student Self-Concept Development**

Ask yourself "How do I feel about the development of children's self concept?"

simple	☐	☐	☐	☐	☐	complex
negative	☐	☐	☐	☐	☐	positive
unwilling	☐	☐	☐	☐	☐	willing
passive	☐	☐	☐	☐	☐	active
closed	☐	☐	☐	☐	☐	open
dilemma	☐	☐	☐	☐	☐	challenge
unrewarding	☐	☐	☐	☐	☐	gratifying
insignificant	☐	☐	☐	☐	☐	significant
cool	☐	☐	☐	☐	☐	warm
detached	☐	☐	☐	☐	☐	involved
conforming	☐	☐	☐	☐	☐	unique

Talents Unlimited
Questions

1. How is this program integrated into the regular instructional curriculum?

2. You mention that you have been cited in the literature. Have you done a systematic review of the literature that pertains to your program so that we can see what has been said--good and bad--about the program?

3. Is there any overall framework for the dissemination of this program or does it rely completely on NDN?

4. See page 6 - Staff development model. How many sites are school-wide as opposed to an individual teacher adopting a program? How many sites are just individual classrooms?

5. Are teachers being taught these things in their regular college education teacher preparation? If so, then is there a need for this separate program?

6. The claim is made that the program is designed for all students, yet there is no evidence presented to support that assertion based on the fact that emphasis seems to be placed on the testing of ethnic and at-risk students. Is there any additional evidence you can provide?

7. What were the actual reasons why "complete data were not received from several systems which originally agreed to participate?" Did they not collect posttest scores or did they decide not to send them in? If they did not collect posttest scores, why not? Any evidence that they thought Talents Unlimited was not working? Was it even implemented in these cases?

8. Other than the specially designed criteria--referenced tests or the Imaginary Lesson Scoring--was any measurement of changes in teacher behavior done? Or of student performance? Or of differences in schools?

Responses to Questions
from Members of the
Program Effectiveness Panel
February 28, 1991

Talents Unlimited
Brenda Haskew, Director

1. How is this program integrated into the regular instructional curriculum?

Talents trained teachers investigate the nature of the content and the nature of the learner as they integrate Talents processes into their instructional curriculum. As these teachers develop Talents activities, they consider two critical factors: 1. Which Talent process will best facilitate the information presented? and, 2. Which student Talent strength should be the focus for this academic information?

For example, the Talent activities below were developed to be a part of several weeks' work in a sixth grade math class. The teaching objectives were the addition, subtraction, multiplication, and division of decimals. During the regularly scheduled math period, these Talents activities were interwoven with the necessary drill and practice activities which increase skill and understanding in these basic math operations. TU activities made these basic mathematical operations more meaningful and, thereby, more relevant to the learner. (It is noteworthy that these kinds of TU activities facilitate higher student scores on newly developed performance based assessment instruments.)

Talents Unlimited Activities to Enhance Sixth Grade Math
Objective: Students will add, subtract, multiply, and divide decimals.

Introductory Activities:

Forecasting - Class will consider many, varied effects on our world if there were no decimals.

Productive Thinking - Total class will list many, varied, unusual uses for the decimals. Students will add to the list throughout the unit.

Communication #2 - Early in the unit, each student will list many, varied single words to describe his/her feelings upon completion of a timed exercise measuring skill in one of the operations. (See similar culminating activity.)

Midway Activities:

Communication #5 - Each student will create a network of ideas in the form of a word problem which will require multiplication of decimals to the hundredths position. (Because class will exchange word problems and solve each item, creator should be certain he/she has correct solution to his/her problem.)

Decision Making - During a discussion of the uses of decimals in linear measurement, students review the metric system. After further discussion in cooperative learning groups, students generate and defend a decision on whether we should continue to use the English measurement system or convert to the metric system of measurement.

Planning - In order to insure success with challenging mathematics homework assignments, each student refers to a generic plan he/she completed earlier in the year to accomplish this task for any subject.

Culminating Activities:

Productive Thinking - Using these newly practiced math skills, the class has computed the batting averages of a local Little League team. Each student will design an unusual, appealing way to graph this information.

Forecasting - After analyzing the graph created in the activity above, the class realizes that during the third week of the season Player X is in a batting slump. The class will suggest many, varied causes for this situation.

Communication #2 - After instruction and practice, students are encouraged to list many, varied, single words to describe their feelings upon completion of a timed exercise measuring skill in one of the mathematical operations. This list is compared to the list generated in a similar introductory activity.

2. You mention that you have been cited in the literature. Have you done a systematic review of the literature that pertains to your program so that we can see what has been said -- good and bad -- about the program?

In analyzing Talents' appearance in the literature, there are three categories of published and unpublished items: 1. Positive articles authored by the Talents staff; 2. Positive articles authored by third party writers, and; 3. A single negative article.

Historically, project personnel for Talents Unlimited have contributed consistently to educational journals and periodicals regarding fresh applications for Talents in today's educational arena. For example, in periodicals like the Roeper Review, The Gifted Child Quarterly, Exceptional Children, and Early Years, Dr. Carol Schlichter, original research director for the model, defined in research and theory Talents Unlimited's applications in all grade levels, in the regular classroom, and in gifted programs. In the April, 1988 issue of Educational Leadership, Dr. Schlichter and another former director of the model, Dr. Deborah Hobbs, coauthored articles relating to that month's thinking skills theme. Another example of the work of these former directors is a chapter in the revised edition of Developing Minds, coedited by Art Costa.

Much of what has been written about Talents Unlimited, however, has been done independently of the staff at the Mobile Talents Unlimited office. Copies of two notable examples are included for your examination. As a general rule, the Talents office learns of a newly published article as a result of written and/or phone inquiries from readers. The national Talents office learned of these articles in the February , 1990 issue of Learning and the winter issue of The Journal for the Education of the Gifted, through reader inquiries for more information about the model. In addition, Talents Unlimited has been a research topic in numerous masters theses and doctoral dissertations across the nation. These documents form the bulk of the ERIC entries. In spite of varied specifics of their research, the authors of these papers concur that Talents intervention positively affected their areas of investigation.

The sole exception to this trend is an article published in The Journal of Educational Research, November-December, 1985. A copy of this article is included for your examination. Because it was, in essence, a replication study, comparison was made to the documented success of other Talents Unlimited studies. There were, however, several significant differences in the research designs. For example, this study allowed for only five hours of Talents inservice training for the teachers involved when a minimum of twelve hours Talents training is required for adoption of the model; this study tested students after only five months of experience with the Talents processes when comparable studies required a minimum of a year's implementation of the model; and this study used an instrument for measuring student performance, the Multiple Talent Test available from Project REACH, which was different from the original research study's Criterion Referenced Tests. Dr. Carol Schlichter, original research director and Dr. James McLean, analyst for the original research data, strongly considered drafting a rebuttal to this article in light of these inappropriate comparisons.

3. Is there any overall framework for the dissemination of this program or does it rely completely on NDN?

Talents Unlimited relies totally on the National Diffusion Network and its structure for dissemination. Talents, however, works collaboratively with other federal programs to address common educational concerns. For example, a workshop recently sponsored here in Mobile offered Talents trained teachers help in developing Talents activities to enhance the Drug Free Schools curriculum, another of the Department of Education's priorities.

4. See page 6 - Staff Development model. How many are school-wide as opposed to an individual teacher adopting the program? How many sites are just individual classrooms?

Even though each state and each site is unique, many Talents adoptions share a common pattern of development. Generally, one or two teachers from a school will at their own or administration request attend a Talents training workshop. After the training, these teachers return to their school full of new ideas and enthusiasm, and recommend the training to other teachers who frequently must wait until the following year, the next federal reporting period, to be trained. Administrators who are committed to the successful implementation of the program give impetus to a ripple effect of trainings and over a period of several years and several workshops, a large percentage of the faculty at the school and possible a large percentage of schools within the district, become Talents trained.

As indicated in the body of the submittal, Talents Unlimited was adopted at over 2000 school sites last year. This figure is compiled annually and reflects only sites represented in teacher training from November 1, 1989 through October 31, 1990. Analysis of thousands of registration forms for this year would reveal the number of teachers trained at each site during the twelve month period, but would not indicate if the extent of cumulative implementation over the sixteen year history of the model.

In an effort to respond to this question, adoption data reported from one state were informally examined. A state was chosen whose number of adoptions most nearly equaled this year's average number of state adoptions, 53. Individual teacher registration forms from Kentucky, reporting 58 adoptions of Talents Unlimited during this time, were grouped by school site to provide a site by site total number of teachers trained. In addition, a 1987-88 Kentucky School Directory offered possible clues to the size of each faculty. Information gleaned from this analysis provides insight into the Talents Unlimited training sessions conducted in the state last year.

Thirty of the fifty-eight sites, or 52%, of the schools adopting Talents were represented by more than one faculty member in last year's training. For example, eleven of the approximate total of thirty-five teachers at Crittenden County Elementary School, twenty-one of Parkway's approximate total of forty-four teachers, and ten of New Highland's approximate total of thirty teachers were Talents trained during this period. Further analysis indicates that at least two Kentucky districts made a district-wide commitment to Talents during this time. For example, in Floyd County teacher representatives from nine of the eighteen elementary grade sites were trained, and in Hardin County twelve of the fourteen elementary schools reported training of teachers.

Twenty-eight adoption sites, or 48%, of the Kentucky adoptions for this period reported only one teacher from each site. Seven of these were from Floyd County where the district-wide implementation of Talents is in its infancy. Other single representatives from their schools may represent a new addition to a Talents faculty, may have personally requested training, may represent the maximum inservice investment the school's budget can allow this year, or, as in the case of Upper Quicksand Elementary, approximate total faculty two, may represent a 50% school-wide implementation of Talents!

One of Talents Unlimited's strengths lies in its trust and empowerment of the individual classroom teacher. Although district level and school wide implementation strategies offer powerful support structures for Talents Unlimited, the fact still remains that a single, dedicated, Talents trained classroom teacher can independently use this model to enhance the thinking skills of each student in his/her class.

5. Are teachers being taught these things in their regular college education teacher preparation? If so, then is there a need for this separate program?

Most college or university presentations of Talents Unlimited are offered at the undergraduate level when prospective teachers receive an overview of several successful thinking skills models. Although this awareness level understanding of Talents Unlimited and similar models alerts teacher candidates to a vital need for teaching process as well as content in today's classrooms, it falls far short of actual Talents training.

The value of Talents Unlimited teacher training is realized in time when the classroom teacher consistently utilizes the Talents processes to engage learners in activities to enhance knowledge and understanding of the content. Immediate classroom application of Talents strategies facilitates teacher competence as well as students' successes. For this reason, staff development rather than teacher inservice has proven the most efficient vehicle for training teachers in the use of these thinking processes.

6. The claim is made that the program is designed for all students, yet there is no evidence presented to support that assertion based on the fact that emphasis seems to be placed on the testing of ethnic and at-risk students. (Is there any additional evidence that you can provide?)

The schools/student populations selected for use in Talents Unlimited research were intended to test the effectiveness of the model with many, varied school situations and their associated student populations. According to the original research documents, selection of experimental schools insured student participants representing all socio-economic levels; a mix of rural, suburban, and urban areas; and racial diversity. As in any strong research design, availability of control groups to simulate as closely as possible the educational/community environment in the experimental schools was also a factor. The goal was not to test any specific student population, but rather to prove the model's effectiveness in a variety of educational and community circumstances. Such considerations were paramount to the model's potential for replication.

Subsequent replication studies referred to in this submittal were conducted at sites which illustrated on a larger scale the success and transportability of the model. Analysis revealed many ethnic populations in this broad sampling of America's children, but this research was not focused on any specific group or groups.

For reasons stated on pages 11 and 12 of this submittal and because funding is currently available for this type research, the most recent use of the Talents Unlimited Criterion Referenced Test in a formal pre-post/control-experimental design has been to document the program's success with special student populations. These investigations are based on research documenting Talents Unlimited's enormous success in the regular classroom arena with diverse groups of students. Programs for specific groups of students, such as Chapter 1 or at-risk, have turned to this broad base of research and adapted Talents to successfully address their goals. Documented research proving Talents' effectiveness and adaptability in many, varied circumstances has led to effective use of the model with these and other special student populations.

7. What were the actual reasons why "complete data were not received from several systems which originally agreed to participate?" Did they not collect posttest scores or did they decide not to send them in? If they did not collect posttest scores, why not? Any evidence that they thought Talents Unlimited was not working? Was it even implemented in these cases?

All districts which originally agreed to participate in this research successfully implemented the Talents Unlimited program. Those who did not offer complete data cited several different reasons. The most common cause for incomplete reporting was a lack of posttest scores. Most of these well-intentioned districts simply did not administer the posttest. Complications reported by districts included newly mandated end-of-year state/district tests which took precedence over any research testing, lack of staff available to administer and proctor the posttest at the appropriate time, site based concerns such as inefficient air conditioning in some classrooms where testing was to take place, and a turn over in central office personnel resulting in redirected commitments for staff members. One district entered into the agreement to gather evidence of the program's success for its school board. During the course of the year, however, school board officials firmly committed to Talents Unlimited so the district felt no need to posttest.

One major problem, however, was that Talents training went so well in the experimental classes that control teachers "borrowed" a few ideas during the year, thus contaminating the group of control students. In fact, this was the reason one district's posttest data which "were collected under conditions considered by the evaluators to be invalid" were not used in the final analysis.

8. Other than the specially designed criteria -- referenced tests or the Imaginary Lesson Scoring -- was any measurement of changes in teacher behavior done? Or student performance? Or differences in schools?

In addition to the tests cited above, these instruments have been used formally in various Talents Unlimited research studies:

For Students:
- Torrance Test of Creative Thinking
- Metropolitan Achievement Test
- California Achievement
- Stanford Achievement
- Iowa Test of Basic Skills
- Piers-Harris Inventory of Self-Esteem
- Coppersmith Self-Esteem Inventory

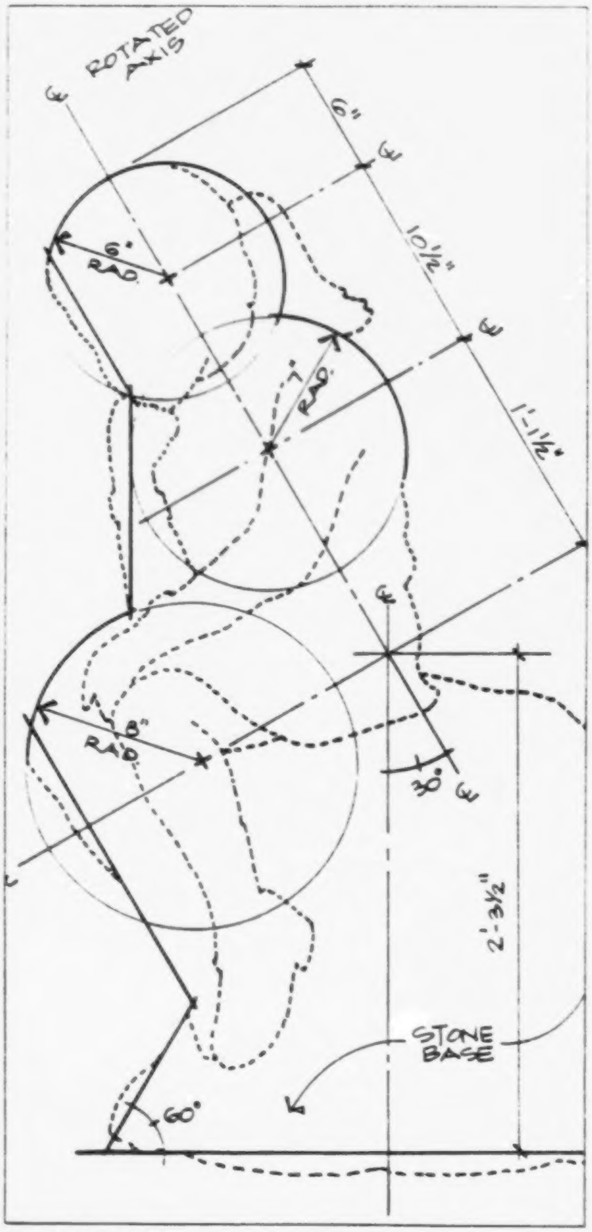
For Teachers:
- Tennessee Self-Concept Scale
- Project developed assessments to measure levels of implementation

Information gathered from these assessments did not directly relate to the claim, and, therefore, was not included in this submittal.

Articles Relating to Review of the Literature
(See Question #2)

BUILDING BETTER THINKERS

A Blueprint for Instruction



DRAWING BY JOE CATELLI

BY JAMES ALVINO

ASKING A GROUP OF TEACHERS IF THINKING SKILLS are important is like asking a group of scientists if the earth is round. But, ask teachers to define the ability to think or to describe state-of-the-art thinking-skills instruction, and the questions and conflicts abound. Should the emphasis be on critical or creative thinking? On the cognitive or metacognitive functions? On a separate or an integrated approach? How do you evaluate skill in thinking?

During the last decade, the accelerating drive for better thinkers has spawned a movement that's not unlike the broader push for educational reform. Like the movement to restructure our schools, the thinking-skills movement represents a major reform—a reform of curriculum. At best, it can provide a framework for choosing and teaching essential skills. At worst, it can offer you too many choices and too little direction. The result: Many teachers are left in a quagmire of confusion, saddled with yet another problem to solve on their own.

This 16-page special section will help you sort through the language, the theories, the methods, and the minefields that are central to teaching children to think. Along the way, be open to nothing less than your own transformation. For some, "teaching for thinking" may mean minor adjustments in teaching style. For others, it may call for a radical departure from the traditional teacher-centered classroom. Your success in creating a thinking classroom—an environment conducive to inquiry and interchange—can depend on taking that important first step.

Defining your terms

"How can I teach thinking if I'm not sure what it is?" That question, which underlies state-of-the-art instruction, serves as the springboard for Robert Baum's article on thinking-skills programs (see p. 51). In his overview, you won't find any easy answers. But you will find many possibilities.

One model that's been used as the basis for several current programs and materials comes from Barry K.

Beyer, a professor of education at George Mason University and an important figure in the thinking-skills movement. In *Practical Strategies for the Teaching of Thinking* (Allyn and Bacon, 1987), Beyer defines thinking as "the mental process by which individuals make sense out of experience." And he divides the process into two categories—the cognitive and the metacognitive.

The basic mental skills and processes of thinking are the cognitive: simple recall, analyzing the parts of a whole, recognizing cause and effect, comparing and contrasting, grouping and classifying, conceptualizing, problem solving, decision making.

The metacognitive is a higher order of thought that involves planning, monitoring, and assessing our own thinking. Metacognition—thinking about thinking—represents the pinnacle of mental processing. In the article by Sandra Kaplan (see p. 42), you'll find 12 important metacognitive strategies, which she calls "learning-to-learn" skills. With these, you can lay the foundation for your students' understanding of the thinking process.

Another key component

According to Beyer and other theorists, certain traits, or dispositions, enable students to think better. Robert H. Ennis, director of the Critical Thinking Project at the University of Illinois, lists 13 such dispositions. These include: tolerance for ambiguity, respect for evidence, willingness to search for reasons and alternatives, willingness to withhold or reverse judgments based on facts, open-mindedness, and sensitivity to others. Kids who possess or learn these traits will benefit the most from whatever formal thinking-skills processes or strategies you implement in your classroom.

But psychological factors—along with certain physiological ones—can throw up major roadblocks to thinking. In her article on p. 48, teacher and learning specialist Priscilla Vail explores these obstacles and offers practical strategies to clear the way for thinking. She reminds us that a classroom is composed of real kids in real situations.

Such factors as learning style, fatigue and hunger, family history, and the limbic system of the brain all figure heavily in a child's ability to think, Vail demonstrates. A sensitive teacher recognizes, and adjusts for, these factors.

The first principle in creating a thinking classroom is to believe *all* students can think

Separate or infused?

Some experts favor infusing thinking skills into all subject areas. Others say that the skills don't get their due when infused into the curriculum because teachers already have to cover a vast amount of material.

But many experts agree that some combination of separate and infused activities will get the job done best. This point is well illustrated by Sally Reis in her article on p. 44. She provides a skills taxonomy and suggests concrete strategies for introducing your students to the separate skills and helping them apply these skills in all subject areas.

Reis's article, as well as Baum's on programs already in place, raises the thorny question of evaluation. How can teachers be sure their students are succeeding at thinking? The standardized basic skills and achievement tests certainly don't measure thinking skills. Most of the programs in Baum's article have their own evaluation component. And a few standardized tests designed for measuring thinking skills do exist. These include the Cornell Critical Thinking Test, the Ross Test of Higher Cognitive Processes, and the New Jersey Test of Reasoning Skills.

However, the future of evaluation clearly lies in teacher-made tests that require students to apply thinking to the curriculum (as suggested in Deborah Burns's worksheet on p. 47). One thing is certain: Unlike convergent thinking tests, whose problems have a single correct answer, the tests of tomorrow will focus less on the answer itself and more on the method the student uses to arrive at it.

Teaching for thinking

Finally, a word to guide you in your planning. You can't cover all the skills presented on Sally Reis's or anyone else's list. You'll need to be selective. But you can accept the challenge issued by Arthur L. Costa, a professor of education at California State University, in *Developing Minds* (ASCD, 1985). He encourages teaching *for* thinking (creating the right school and classroom conditions), *about* thinking (helping students be more aware of their own cognitive processes), and *of* thinking (direct instruction of specific skills).

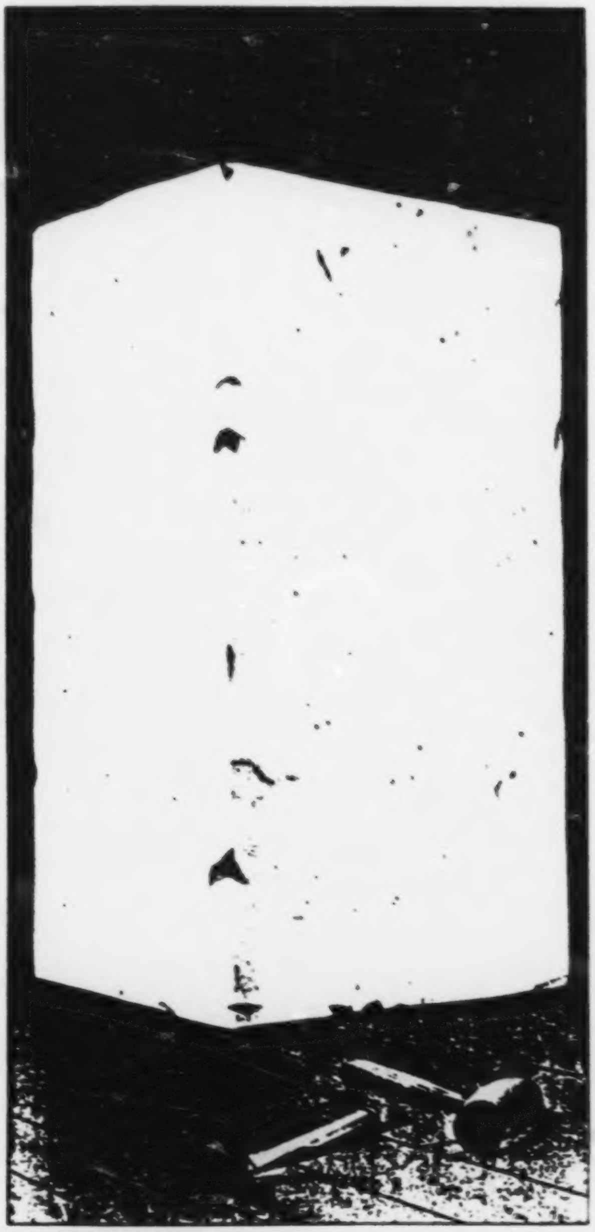
For you, the teacher, this involves posing problems that stretch and strengthen students' abilities, responding to students' ideas in ways that keep them open and thinking, and modeling the behaviors and dispositions that facilitate thinking.

Building better thinkers is a great and exciting challenge. I offer you these simple guideposts borrowed from Costa: Believe all students can think, not just the gifted ones. Let your students know that thinking is a goal. Create the right climate and model it.

In the end, the reward of the teacher-student relationship will be bringing to life those habits of learning that transform children from the inside out.

James Alvino is director of the Education Institute of the School of Education at Glassboro State College in New Jersey. He is the guest editor of this special section on thinking skills and has taught Philosophy for Children to 3rd graders

THE START-UP STAGE



ILLUSTRATIONS BY VERLIN MILLER

Where to Begin

BY SANDRA N. KAPLAN

THINKING ABOUT YOUR OWN THINKING, OR METAcognition, depends on abstract reasoning that develops more fully as children mature. But that doesn't mean elementary teachers should ignore metacognition. You can instill positive attitudes toward learning by teaching "learning-to-learn" skills (at right) that prepare younger students to plan, monitor, and assess their own thinking about learning as they become developmentally ready.

Unfortunately, there's a myth that such attitudes and habits of mind develop naturally. Actually, they're acquired. To encourage students to think, teachers need to promote the value of lifelong learning.

Young children can understand the metaphor of a knowledge bank. Help them see that just as people save money in a bank, they accumulate knowledge. We "deposit" information to "withdraw" later when we need it. Emphasize to your students that it's all right to enjoy learning, that doing well in school doesn't mean something's wrong with them. Encourage them to value their schoolwork. Help them appreciate its long- and short-term benefits.

Sandra N. Kaplan is a visiting associate professor at the University of Southern California and associate director of the National State Leadership Training Institute on the Gifted/Talented.

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12 LEARNING-TO-LEARN SKILLS

Learning-to-learn skills prepare students for the more complex skills of metacognition, which will eventually become a framework for all the individual thinking skills (see p. 45) you teach. They'll help students gradually realize that learning is within their control. And these skills will make students active, rather than passive, learners.

You can introduce the skills separately, then apply them to substantive subject matter, or you can teach them in conjunction with specific curriculum objectives. But however you teach them, you'll want to integrate the skills into your daily curriculum. Then your students can begin to practice and perfect them independently.

You'll probably want to tailor the following list of learning-to-learn skills to match your own classroom priorities. You may want to add or subtract skills. And to help you make sure your students learn the language of thinking, you can use it to introduce or reinforce thinking-process vocabulary such as *estimate, transfer,* and *collaborate.* When you're satisfied with your list, consider posting it as a "Think First" reminder chart.

1. "Think about what the lesson means to you." Help students connect what they're learning to experiences in their daily lives. For example, in a lesson comparing and contrasting the relative merits of two bicycles, you might tell your students that they're learning to make judgments and evaluate options. This will enable them to make good decisions about spending their money—on bicycles or anything else.

2. "Estimate how long it will take you to do the lesson or project." Students need to make realistic appraisals of the time a task will require. Ask your students how long they think an assignment will take. Based on their responses, help them see the difference between wishful and realistic estimates of time so they can budget accordingly.

3. "Transfer what you've learned to other situations." Teach students to look for continuity between previous learning and new learning. They should ask themselves: *Where* does it fit? *How* does it fit? *Why* does it fit? During a math lesson, you might ask them: "What do we already know about addition that will help us understand multiplication?"

4. "Push your thinking to the limits and take a chance." Encourage your students to try new tasks, to take risks. And let them know that "failing" at a new task is okay and teaches us something.

5. "Organize a task into its essential parts." This coping skill helps students manage their work and helps keep them from feeling overwhelmed. Teach them to focus on a task step by step. In writing a story, for example, suggest that they decide on the main idea and title first, then develop the characters and details of the plot.

6. "Determine what materials you'll need for an assignment before you start it." Have your students identify and obtain the required materials ahead of time. For a math assignment, they might need various manipulatives (Cuisenaire rods, charts, a calculator). For an English assignment, a supply of scratch paper might help. Getting set for a multimedia project will be a challenge.

7. "Decide how you can collaborate with your classmates." Explain that everyone has different strengths, and give your students permission to get help on a project or task from a friend who's particularly knowledgeable about the subject. Encourage students to build a personal support system.

8. "Learn to work for yourself—not the teacher or your parents." One of education's greatest challenges is to help students who are working mainly to satisfy a requirement or to please someone else become self-motivated (or, to put it another way, to help change their locus of control from an external to an internal one). Help your students to take pride in a job well done. Ask them to chart their satisfaction levels for various activities on a scale of 1 to 10. Then have them think about why one task was more satisfying than another. Help them use this information to explore other interests through school projects or extracurricular activities.

9. "Stop and regroup if you're feeling frustrated." Help students understand that frustration is a part of learning. Emphasize that they shouldn't feel unworthy because they sometimes have to struggle to learn. Tell them that they'll all experience peaks, valleys, and plateaus but that they can learn from the valleys. Make yourself available as a sounding board and encourage students to express their frustration as a first step toward overcoming it. Discuss biographies of famous people who are models of perseverance. For example, Thomas Edison made 120 attempts before he found a filament that worked for his incandescent light bulb.

10. "Know you have choices when you get stuck." Make your students aware that they have three options when they face an obstacle. They can run away from it, they can go around it, or they can go through it, do their best, and learn from the experience. Help them assess which obstacles are worth going through and which are not, as well as the consequences of their choices. But give them permission to *make* those choices.

11. "Remember that discussion is a give-and-take process." Help students understand that discussion and debate involve listening to other points of view as well as stating and standing up for our own ideas. Show your students how to balance sensitivity and assertiveness. For example, when they disagree with someone, they might preface their views by saying, "I understand why you feel that way, but . . ." And help them learn to assess the merits of criticism without feeling threatened, so they can use it constructively.

12. "Separate your self-worth from your work." This self-concept skill is basic to all learning. Tell and show your students that they are worthy of respect and love just for being themselves—with their weaknesses as well as their strengths. Explain that evaluation of a person's work should not be taken as a comment on that person's worth as a human being.

What to Teach When to Teach It

BY SALLY M. REIS

RESEARCH HAS SHOWN THAT INTRODUCING many thinking skills haphazardly at various grade levels does little to change how students think. To begin formal thinking-skills instruction—either as part of a districtwide or schoolwide program—teachers need a plan. This plan should consist of a well-thought-out list (taxonomy) of skills, a timetable (scope and sequence) for teaching them, and effective teaching techniques.

This article will finish laying the foundation for thinking-skills instruction by adding to the "learning-to-learn" skills a taxonomy and a scope and sequence (see the chart on p. 45). The next article, "Teaching Techniques" (p. 46), completes the thinking-skills structure by showing you how to develop your own worksheets and lesson plans.

The taxonomy

The chart presents a condensed version of a taxonomy developed over a 6-year period at the University of Connecticut. The complete taxonomy, which is used in the Torrington, Conn., school system and in districts throughout the country, includes many other specific skills. For example, under creative thinking you'd find brainstorming, fantasizing, magnification, and substitution. Under creative problem solving and decision making, you'd find problem and idea finding, choosing the best alternative, and evaluating actions. And under critical and logical thinking, you'd find comparing and contrasting, sequencing, and analyzing propaganda and bias.*

The Connecticut taxonomy is only one of several available thinking-skills lists developed by researchers and theorists. But whatever taxonomy you decide on, having something to guide you will ensure a more organized and thorough approach to helping your students become good thinkers.

The timetable

It may seem obvious that the simpler skills should be taught in the early grades and the more complex ones in the later grades. But it's not always easy to determine when kids are developmentally ready for a skill or in what order the skills should be taught. The timetable on the chart shown here is the result of several years of work with hundreds of children. Of course, it's only a guideline. But guidelines can be real lifesavers in a complex area such as teaching thinking skills.

For example, you can successfully introduce simple creative thinking skills such as brainstorming, flexibility, and originality in the earlier grades, then reinforce them as students mature. But most young children aren't developmentally ready for critical thinking and reasoning skills, which require abstract reasoning. Depending on the maturity of your students, you may want to wait until 4th or 5th grade to begin teaching these skills.

Sally M. Reis is a professor of educational psychology at the University of Connecticut. She is director of the Young Scholars Gifted Program for EAST-CONN, a regional educational service center in northeastern Connecticut. She was a classroom teacher for 15 years.

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*To obtain a copy of the "Taxonomy of Type II Enrichment Processes," which lists more than 80 thinking skills and subskills, send a stamped (25-cent), self-addressed envelope to: Dr. Sally Reis, Department of Educational Psychology, University of Connecticut, Dept. L90, Box U-7, Room 28, 231 Glenbrook Rd., Storrs, CT 06268.

THINKING-SKILLS TIMETABLE

Skill / Grade	K	1	2	3	4	5	6	7	8
Creative thinking skills									
Fluency	P	E	E	R	R	R	R	R	R
Flexibility	P	E	E	R	R	R	R	R	R
Originality	P	E	E	R	R	R	R	R	R
Elaboration	P	E	E	R	R	R	R	R	R
Guided imagery	P	P	P	I	I	I	I	I	I
Creative problem-solving and decision-making skills									
Creative problem solving				E	E	R	R	R	R
Future-problem solving				P	P	P	E	E	I
Critical and logical thinking skills									
Analogies/syllogisms				P	P	E			
Deductive reasoning				P	E	R	R	R	R
Interpreting/inferring						E	R	R	R
Patterns/figural relationships	P	E	E	I	I	I	I	I	I
Classifying	P	E	E	I	I	I	I	I	I
Hypothesizing						E	R	R	R
Learning-to-learn skills (readiness for metacognition)				P/I	P/I	E	E	R	R
Metacognition (Planning, monitoring, assessing)						P/I	P/I	E	E

Key:
- **P** Prepare (readiness activities)
- **E** Emphasize
- **R** Reinforce
- **I** Individualize (separately or in small groups)

Adapted from the scope and sequence of thinking skills used in the Torrington, Conn., schools and developed by Sally Reis and Joseph Renzulli and the University of Connecticut.

WORK IN PROGRESS

Teaching Techniques

BY SALLY REIS

STUDENTS WHO ARE TAUGHT FEWER THINKING SKILLS, but in greater depth, learn them better. That's what our field testing with children in Connecticut schools has shown. We found that students who'd really mastered a thinking skill or skills had worked with teachers who'd introduced a few skills, taught them step by step, demonstrated how to use them within the content areas and with special projects, and made sure students practiced each one several times during the year.

We also found that students who succeeded best learned a skill in the early grades and relearned it, through more complex applications, in subsequent years. For example, 7th graders who'd been introduced to the steps of creative problem solving in 3rd grade and who'd reviewed them in 5th grade could effectively use those steps.

A starting point

So a good way to get started teaching thinking skills is to review a taxonomy and select three or four skills (perhaps one from each category on the chart on p. 45) to teach all year. You'll want to base your choice on your students' needs and abilities and on your teaching style and curriculum. After you've selected the skills, explore various methods of teaching them. You may want to use commercially available materials or develop your own lesson plans or worksheets.

Deborah Burns, who teaches at the University of Connecticut (and is a coauthor of "Program Buyer's Checklist," p. 53), has developed a "Thinking-Skill Worksheet" (at right). You can use the example sheet (adapted from hers and filled in for the skill of comparing and contrasting) as a model for teaching any skill and for developing worksheets of your own.

Two approaches to teaching a skill

The Burns worksheet suggests starting the lesson by having the students experiment with the skill of comparing and contrasting. *After* the students identify the

THINKING-SKILL WORKSHEET

(for teaching comparing and contrasting)

Name: Deborah Burns **Grade level:** K–6 **Name of the skill:** Comparing and contrasting

Definition of the skill: Comparing and contrasting involves analyzing two or more ideas or variables in order to find similarities and differences.

Reason to study the skill: Comparing and contrasting (like sequencing, classifying, and categorizing) is a preliminary skill at the root of more complex thinking. At the basic level, it helps a thinker note physical differences between objects; at the abstract level, it helps in detecting likenesses and differences between concepts, a key to drawing valid conclusions.

What students need to know in advance: Students need to understand the difference between "similar" and "different" and be able to identify similar characteristics.

Focusing and modeling activities: Begin by talking about twins. Ask whether your students know any twins. Elicit stories about the twins' similarities and differences. Next, display two seemingly identical goldfish, geraniums, hands, or shoes, and search for similarities and differences. Model the strategy [the heuristic procedure below]. Show the students three oranges, and—using a transparency, chart paper, or the blackboard as your worksheet—demonstrate (step by step) how to compare them.

Procedure for learning and practicing the skill (heuristic): Step-by-step strategy for comparing the four jacks in a deck of cards. Ask students to:

1. State their purpose for comparing and contrasting (to find the differences in the jacks).
2. List the objects being compared (the four jacks) across the top of a sheet of paper.
3. List all the characteristics or variables (color, suit, number of eyes, bent corners, and so on) of the cards down the left-hand side of the paper; then draw in lines to create a grid.
4. Look at each card carefully and fill in the grid.
5. Scan their completed worksheet to look for trends. Are the cards more similar or more different? Which characteristics best describe the similarities? The differences? Discuss.
6. Draw some conclusions. Be able to support the conclusions with information from their grid.

Discussion questions:

- What was the first thing you did to begin this task? What was the hardest part?
- Which features did you choose to compare for your analysis?
- Did you compare any characteristics by using various degrees of a quality (length, softness, cost, etc.)?
- Did you base any of your comparisons on personal values?
- How could this skill improve your writing? Your purchasing decisions? Your work in science?

Principles to remember about the skill:

- Identify characteristics before you compare and contrast.
- Use only characteristics shared by *all* items or ideas in a group for comparison.
- Wait to assess major contrasts or similarities until you've looked at *all* the characteristics.

Practice activities: Students can practice comparing and contrasting by analyzing differences in: five students' jackets, a handful of coins from various countries, and so on.

Reinforcement activities: As students become better at comparing and contrasting the physical features of objects, have them transfer the skill across the curriculum. For example, have them compare:

- The political platform of two candidates.
- The economic structure of two or more countries.
- The protagonist and the antagonist in a novel.
- The style of two artists from the same era.
- The skeletal structure of two organisms.

Evaluation criteria: Make a checklist of each of the steps of the procedure and the principles to remember. Can students apply each one? And can they transfer what they know to other situations?

THINKING-SKILL LESSON PLAN

(for teaching how to detect bias)

1. Introduce the skill by writing its name on the chalkboard and defining it with examples and synonyms. Dictionary definitions are useful. For example, bias means "prejudiced outlook" or "unreasoned distortion of judgment." Give your students time to recall and discuss what they already know about bias.

2. Explain (on the blackboard or with a handout) clues and procedures for identifying bias. Clues include: use of loaded words, overgeneralizations, one-sidedness, and so on. Outline a procedure for detecting bias. For example, tell students to follow these steps:

- State your goal: *to see if this material (article, speech) is biased.*
- Identify some clues that indicate that the material is biased.
- Search the material line by line or phrase by phrase to find examples of such clues.
- Identify any pattern among these clues.
- State, and give evidence to support, the extent to which the source is biased.

3. Demonstrate the skill, using an example of biased data. Walk your students step by step through the above procedure, then review the process.

4. Have your students, individually or in pairs, *apply* the skill as you modeled it, to examine a second example of biased information.

5. Have your students *reflect* on and share what they did in executing the skill. They should pay particular attention to the processes they used, any difficulties they encountered, and how well they succeeded in meeting their goal—detecting bias.

characteristics of the objects under consideration—in this case, oranges—you demonstrate the procedure. But you *could* easily use the worksheet to do things the other way around. You could first give students the definition and explain the procedures and rules. Then you could demonstrate how the skill is used and have students apply it.

Thinking-skills theorist Barry K. Beyer believes both strategies (he calls the first "inductive" and the second "directive") are useful. He suggests that teachers use both—varying their approach to meet the demands of the curriculum and to match the students' ability levels and learning styles.

The lesson plan at left, another model on which you could pattern your own lessons, shows how Beyer would use the directive strategy to teach the critical thinking skill of detecting bias. Beyer stresses the importance of having students practice a skill many times. For example, you could have students examine primary and secondary sources in history for bias. Newspaper and magazine articles and political speeches are good fodder, too.

Beyer also suggests that teachers provide lots of opportunities for students to transfer their knowledge. For example, students can use the same step-by-step procedure, or heuristic, to examine bias in film, in conversation, or even in their own attitudes and beliefs. Using the same procedure consistently is what makes the skill transferable. And practice is what finally gives kids mastery of the metacognitive skill of transfer.

Believe in yourself!

Our experience in the schools, coupled with evidence from multiple research studies, has shown that teaching thinking skills works and that teachers can do it well. Clearly, with the current explosion of knowledge and the overwhelming amount of content required in most subject areas, teaching *how* to think, rather than *what* to think, is a necessary goal in all classrooms.

Obstacles to Thinking

BY PRISCILLA L. VAIL

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SOME STUDENTS DON'T THINK BEcause they don't know how, but others don't think because their thinking ability is blocked. Certain blocks to thinking are obvious. Kids who are hungry or tired—or just don't get into gear until 11 o'clock—will have trouble with higher-level thinking. The same is true for kids with undiagnosed or unaddressed learning problems. Keeping some snacks on hand, talking to the parents about home habits (including invasive TV watching), and switching the time of certain activities can help. So can becoming more sensitive to the signs of learning problems, and more demanding about testing and remediation.

But other obstacles to thinking aren't so obvious. They can arise from psychological pressures, such as perfectionism and guilt, or from outside demands, such as family expectations and mandated course material.

Here's how to uncover these hidden obstacles. And, equally important, what you can do to push them aside.

Psychological pressures

- *Perfectionism*. Students whose early schoolwork was mechanically correct or who are good memorizers may become overly dependent on high marks. When the curriculum shifts from "How do you spell...?" to "Why do you think the boy might feel sad...?" these students may recite from the book or deliver a safe answer to please the teacher. But parroting is not thinking, and dependency on high grades undermines risk-taking.

What you can do: *Academic exercises that honor originality over conformity can lure perfectionists into new territory. Older students who have gotten by on memorizing and reciting may need thinking exercises and strategies designed for younger children.*

- *Guilt*. From ages 3 to 6 children typically engage in "magical thinking": They assume that outside events happen because of what they are thinking and feeling. If a separation, divorce, or death occurs during this period in the child's growth, guilt at being the cause of the tragedy can add its weight to natural sorrow and fear. An affected child has little energy for thinking in school. Unfortunately, the effects of this kind of guilt can persist after the child has outgrown magical thinking. So older kids may be suffering, too.

Children who are tired, hungry, or upset can't think. They need help first.

What you can do: *If the problem seems extreme, you'll want to involve the school's psychological support system. Although the effects of separation, divorce, and death may last for over a year, be careful not to blame them for everything. Be sure to ask your school psychologist to screen for undetected learning disabilities. In day-to-day activities, identify and praise concrete, specific examples of the student's positive contributions to the class.*

- *Mourning*. Children of separated, divorced, or deceased parents mourn, a process with no shortcut. Temporary loss of concentration and difficulty with memory are natural.

What you can do: *Reassure the child that his difficulty with thinking straight won't last. But do hold him accountable for manageable amounts of work. This will help keep him anchored to day-to-day reality and speed his recovery.*

- *Depletion*. Children who've suffered loss—whether through moving, through displacement of their position in the family by a new sibling, or through a separation, divorce, or death—feel a sense of depletion. Fearing further loss, they may protect themselves by clamming up and hoarding their thoughts.

What you can do: *Gently draw them out and help them discover that ideas shrivel when kept inside but multiply through sharing. Brainstorming and cooperative learning are particularly helpful to these children.*

Outside demands

- *Family history and expectations*. Many kinds of home situations can hinder thinking. For example:

—Students from families that value good marks above all (the drive toward a top college starts early) are under pressure to deliver correct answers to convergent questions. And the deck is stacked against the teacher who says, "Take a chance on an idea."

—Students from families with a history of learning problems, particularly in reading, may struggle so hard with the mechanics of reading that pace and content are overwhelming. Inference and interpretation are unattainable luxuries. But when reading is not involved, these same students may think very well—in class discussions, for example.

—Students from families that don't take time for conversation and exchange of ideas are unpracticed in the basics of thinking. They need to be shown how to use words for explanation, defense, and extension of ideas, not to mention humor.

—Students from families of other cultures may have been taught that asking questions, offering ideas, or even making eye contact with teachers (authority figures) are forms of insolence and defiance. Teachers can easily misinterpret their compliance and good manners as inability or unwillingness to think.

What you can do: *Make yourself aware of your students' backgrounds, attack the specific problems, and use parent-teacher conferences to bridge the gaps.*

- *Learning style*. A mismatch between the student's learning style and the teacher's teaching style can bruise self-esteem and abort the thought process. For example:

—The wrong teaching strategy can be particularly disastrous in early reading instruction for learning disabled students. Some who would do splendidly with phonics may not be able to manage look-say reading. Such early failure can cast a lifelong shadow of self-doubt.

—Students who have trouble processing spoken material fall behind quickly when their teachers rely mostly on lecture and discussion. Including graphs and lots of visual aids can rescue these students and provide livelier learning for everyone.

—Some students need words along with the science demonstrations or math examples in order to remember the concepts.

—Students who enjoy playing with open-ended questions are frustrated and turned off when they're expected to channel their thinking to reaching one correct destination.

***What you can do:** Offer multisensory training (visual, auditory, kinesthetic/tactile) to all children in the class and use materials and techniques that take a variety of approaches to learning. And give part of the day to truly open-ended questions to encourage creative thinking.*

- *Classroom climate.* The emotional brain, the limbic system, has a powerful effect on abstract reasoning, memory, and associative thinking. When the climate becomes too competitive (emphasizing high or low marks), threatens humiliation, or highlights errors, many students are fearful. As a result, their brain's emotional pathways signal danger and block logical and flexible thinking.

Teaching kids *how* to think rather than *what* to think is the key to success

***What you can do:** Be sure you create a comfortable atmosphere. Ask yourself if the above dangers lurk in your classroom. If they do, find ways to remove them.*

- *School and district expectations.* Some schools measure worth by what is quantifiable: accelerated curriculum and high test scores. Many fine teachers have been caught between how they want to teach and what they must do for test results. Percentile priorities usually work against a curriculum based on thinking. Yet the irony is that only thinking produces really fine results in the long run.

***What you can do:** Research is showing that if you create a comfortable classroom that encourages exchange of ideas, and present information in an interesting, pertinent, and accessible way, students can think and do well on the tests. Also, encourage your school and district to move toward new systems of accountability that foster thinking instead of rote learning.*

In her book *Engaging Children's Minds*, the prominent early childhood educator Lillian Katz points out that confidence, belonging, and dignity are learned from experience, and that these are what facilitate the freedom to think and learn. Courage, resilience, curiosity, diligence, and a good dose of humor work from inside the child, giving permission to think instead of recite. Teachers can bring the same qualities to bear from the outside, beckoning the young learner to a kingdom of thought peopled with trustworthy guides.

Priscilla L. Vail, learning specialist at the Rippowan-Cisqua School in Bedford, N.Y., is the author of *Smart Kids with School Problems: Things to Know and Ways to Help* (Dutton, 1987).

A GLOSSARY OF THINKING-SKILLS TERMS

The following terms are frequently found in the thinking-skills literature. Their meanings may vary among experts.

Basic skills—Broadly, the three Rs, often considered counter to "higher-order" thinking.

Bloom's Taxonomy—Popular instructional model developed by the prominent educator Benjamin Bloom. It categorizes thinking skills from the concrete to the abstract—knowledge, comprehension, application, analysis, synthesis, evaluation. (The last three are considered "higher-order" thinking skills.)

Bridging—Creating lessons for the regular curriculum that supplement or reinforce thinking-skills instruction (see "Infusion" and "Transfer").

Cognition—The mental operations involved in thinking; the biological/neurological processes of the brain that facilitate thought.

Creative problem solving (CPS)—A multistep procedure for solving problems by identifying a problem, brainstorming for possible solutions, evaluating solutions according to some decided-upon criteria, accepting and applying the best solution and assessing the outcome.

Creative thinking—A novel way of seeing or doing things that is characterized by four components: fluency (generating many ideas), flexibility (shifting perspectives easily), originality (conceiving of something new), and elaboration (building on other ideas). Also called "divergent thinking" or "productive (inventive) thinking."

Critical thinking—The process of determining the authenticity, accuracy, or value of something, characterized by the ability to seek reasons and alternatives, perceive the total situation, and change one's view based on evidence. Also called "logical thinking" and "analytical thinking."

Heuristics—The rules of thumb that govern good thinking; the step-by-step procedures used in applying a thinking skill.

Infusion—Integrating thinking skills into the regular curriculum (see "Bridging" and "Transfer"). Infused programs are commonly contrasted to "separate" programs, which teach thinking skills as a curriculum in itself.

Metacognition—The process of planning, assessing, and monitoring one's own thinking; the pinnacle of mental functioning. Also called "executive functions."

Thinking skills—The set of basic and advanced skills and subskills that govern a person's mental processes. These skills consist of knowledge, dispositions, and cognitive and metacognitive operations. They are frequently contrasted to "basic skills" and called "basics of tomorrow."

Transfer—The ability to apply thinking skills taught separately to any subject (see "Bridging" and "Infusion"). Regarded as a higher-order thinking skill that must be taught.—J. Alvino

FINISHING TOUCHES

10 Top Programs

BY ROBERT BAUM

TO HELP YOU AND YOUR SCHOOL MAKE A SOUND DEcision on which program or programs to undertake, 10 of the best are reviewed here. These 10 span the breadth of options, and reviewing them will allow you to consider two basic issues:

- *Do you want to infuse thinking skills into the established curriculum, or do you want a separate course on thinking skills?*
- *What kinds of thinking skills do you want your students to learn: Critical? Creative? Those dealing with content learning, reasoning, or problem solving?*

You may decide on a combination of the choices.

All of these programs have proven effective. Each reflects a strong theoretical base and a successful evaluation model. Those marked "NDN" have been validated by the Department of Education's National Diffusion Network, which shares successful education programs among schools. NDN programs have been field-tested. (Validating tests generally show that participating students performed at significantly higher levels than nonparticipating comparison groups.) For more information about NDN-approved programs, ask the national office for the name of your state NDN facilitator. Contact: National Diffusion Network, U.S. Department of Education, 555 New Jersey Ave., NW, Washington, DC 20208-5645; (202) 357-6134. For a complete list, including other programs worth noting and all program addresses, see "Ready References," p. 55.

INFUSED PROGRAMS

Comprehensive School Mathematics Program (CSMP) (NDN)
CSMP is an elementary-level mathematics curriculum focusing on classification, elementary logic, and number theory. Children move through problem-solving sequences in gamelike and storylike settings relevant to their age and interests. The program uses computers, calculators, and geometry models to pose problems, explore concepts, develop skills, and define new ideas. CSMP is adaptable for whole-group, small-group, and individualized instruction. The program requires 2 to 5 days of training.

From the field: *Dean Pedersen, director of curriculum services, Poudre R-1 School District, Fort Collins, Colo.*—I don't know if CSMP is a math program that teaches thinking skills or a thinking-skills program that teaches math! My district selected this program because our students could do basic functions—addition, subtraction, multiplication, and division—but couldn't solve more complex problems.

Implementing CSMP is complicated, however. It requires applying new approaches daily. You'll need the full backing of your staff.

Higher Order Thinking Skills (HOTS) (NDN)
HOTS, a computer lab pullout program for Chapter 1 elementary students, is based on the idea that mastery of basic skills isn't a prerequisite for engaging in higher-order thinking activities. In fact, HOTS uses sophisticated thinking skills to improve basic skills. It also emphasizes building self-confidence. Teachers attend a 1- to 2-week training workshop to learn to meld computer skills with Socratic coaching techniques.

From the field: *Ted Mruk, Chapter 1 elementary school teacher, Altar Valley School District, Tucson, Ariz.*—I become a hot-air-balloon pilot—complete with goggles, scarf, flight cap, and leather jacket—to get my students excited about *Riding the Wind* (Scholastic Microzine), a computer simulation of a balloon race. The students usually crash early on. But after many crashes, they learn to read their gauges, their altimeter, and the direction and speed indicators. Before returning to the computer, the students must plot strategies for winning the race. Afterward, we discuss their approaches and results.

The message of the '70s was 'back to basics.' In the '80s thinking became one of the basics.

Institute for Creative Education (ICE) (NDN)
ICE is a creative problem-solving process. The program was NDN-approved for whole-classroom use in grades 4–6 (although a full K–12 curriculum subsequently evolved). It develops students' abilities to respond to problems more fluently, flexibly, originally, and elaborately. Teachers receive curriculum materials at a 2-day training workshop.

From the field: *Carol Kalp, 1st-grade teacher, Center Grove School, Randolph, N.J.*—My 1st graders love ICE. Its basic brainstorming and categorizing activities let their minds whirl like never before and then help them organize their world. Take the poem "Widget." Each child imagines what a widget might be. The brainstorming promotes creative, abstract thinking. The class looks for the most unusual responses and then categorizes them. I incorporate the ICE principles throughout the curriculum and do an independent ICE activity with my students at least once a week.

Kids Interest Discovery Studies Kits (KIDS Kits) (NDN)
KIDS Kits generate active, self-directed learning and higher-level thinking. Teachers and library media staff develop kits on topics such as Indians, astronomy, the body, local history, and drug abuse, based on a schoolwide survey of student interests. A program coordinator needs about 6 hours of training.

From the field: *Mary Lee Moore, director of media services, Chatham County schools, N.C.*—KIDS Kits give students access to a wide variety of media that they might not otherwise have a chance to use. The kits contain books, filmstrips, tapes, models, study prints, computer software, and so on; they're suitable for all grade levels, a variety of learning styles, and a wide range of abilities. The strength of the program depends on the teachers working as a team under the media center coordinator.

Sage
This program, designed for gifted elementary students, develops higher-level thinking skills through extending the regular curriculum. Thinking-skills development, mini study units, and independent study are incorporated. A 2-day teacher training workshop is recommended.

From the field: *Margaret Trundy, elementary gifted and talented teacher, Framingham School System, Framingham, Mass.*—Sage is neither acceleration nor enrichment. It's a program of differentiation. It emphasizes abstract thinking. I'm a more creative, flexible thinker because of the children in the Sage program. We're learning from each other.

Don't be lulled into believing that thinking-skills programs are frivolous. Children need to be challenged like this or they'll turn off.

Talents Unlimited (TU) (NDN)
TU is content-oriented and designed for elementary school students at all ability levels. The program helps students develop multiple thinking skills (called "talents"). These skills include productive thinking, commu-

nicating, planning, forecasting, and decision making as they relate to academic subjects. Two days of training are required.

From the field: *Pat Thomas, kindergarten teacher, Lockwood Elementary School, Clovis, N.M.*—My district is using TU because the lessons fit easily into the curriculum. I apply TU everywhere—to reading, science, math, and history. One of my students told me, "TU makes us think—it *really* makes us think."

I've been using TU for 7 years. I advise teachers to begin easy and let the process flow. Don't force it.

SEPARATE PROGRAMS

CoRT (Cognitive Research Trust)

CoRT is an all-inclusive program that involves critical, creative, and constructive thinking. The program is made up of 60 lessons (15 minutes each) for use over a 3-year period. CoRT can be used with students of any age. Teacher training involves two weekend seminars.

From the field: *Teresa Casarez, 3rd-grade teacher, St. John of God Elementary School, Norwalk, Calif.*—CoRT helps my students (two-thirds of whom are Hispanic) increase their productivity and improve their coping skills for the world outside school, where they are a minority.

The children learn to consider the consequences of their actions. The program also helps them expand their perspective, solve problems, organize information, ask questions, and apply thinking to decision making.

Instrumental Enrichment (IE)

IE is a cluster of problem-solving tasks and exercises that improves students' ability to learn. It's aimed at students in upper elementary, middle, and high school. IE is designed to be taught for a full period, 2 to 5 days per week, for a 2- to 3-year sequence. Teacher training involves a minimum of 45 hours.

From the field: *Annie Tauberg, 7th-grade English teacher, George Washington Middle School, Ridgewood, N.J.*—Today I overheard a student applying an IE principle out loud during a grammar lesson: "Let's see, first I have to determine what kind of verb I have, linking or action." IE calls this "transfer and bridging"—infusing the lessons into other curricular areas.

My students have become more deliberate in their thinking because of IE. They're better problem-solvers.

Philosophy for Children (NDN)

Philosophy for Children transforms the classroom into a community of inquiry delving into the themes of novels written especially for the program. Themes include truth, beauty, fairness, justice, freedom, authority, education, and other personal and social issues that involve ethical decision making. The program requires three 40-minute periods per week. There's a 3-day introductory seminar, but on-site teacher training programs may extend 2 years.

From the field: *Patrick Dugan, 3rd-grade teacher, University City Public School System, St. Louis, Mo.*—During the national smoke-out 2 years ago, I was sitting on the floor having a discussion with the kids. I took out a cigarette, lit it, and started smoking. This quickly got the students into the discourse. "Why are you smoking?" one child asked. "That makes me sick." Our debate proceeded from there.

Philosophy for Children teaches elementary school children to apply logic to their daily lives. The program improves their reasoning ability and creativity by stressing reading comprehension and discussion of ideas.

PROGRAM BUYER'S CHECKLIST

BY DEBORAH E. BURNS AND RICHARD OLENCHAK

Can you answer yes to the following questions about the thinking-skills program you're considering for your classroom?

☐ *Is a list of the thinking skills, their definitions, and a scope and sequence included?*

☐ *Does the program provide a strong, motivating introductory activity?*

☐ *Are there suggestions on how the teacher can model the skills so that they relate to real-life situations?*

☐ *Are the steps or components of each skill explained and broken down into small, easily mastered steps?*

☐ *Does the program provide enough practice activities—including activities that give students a chance to use the skill in different contexts?*

☐ *Does the program list common trouble spots and provide suggestions for evaluating students' work?*

Dr. Richard Olenchak teaches in the gifted and talented program and researches thinking skills at the University of Alabama. Dr. Deborah Burns teaches in the gifted program at the University of Connecticut.

Structure of Intellect (SOI)

SOI identifies 90 different thinking skills, ranging from basic, foundation-level skills to advanced, higher-order skills. Designed for any age and ability level, the program emphasizes reasoning as the key component for successful learning. Teachers are trained to diagnose student weaknesses and apply remedial activities.

The program requires a 2-day teacher development seminar. Because SOI materials call for specific methodology, teachers must upgrade their training on a regular basis.

From the field: *Rabbi Joseph Cherns, educational director, Yeshiva Day School in Lincoln Park, Yonkers, N.Y.*—SOI helps us address students' individual abilities and learning styles. With the SOI test results, we can pinpoint student weaknesses, then plan an attack integrating SOI materials into the curriculum. All our students have been SOI tested.

This is not an easy model to understand. Teachers must be dedicated. But the results make the program worth the work.

Robert Baum is the former managing editor of *Gifted Children Monthly* and a former classroom teacher in New Jersey.

10 TOP PROGRAMS AT A GLANCE

Program (year founded)	**Emphasis** (Infused or Separate)	**School Adoptions**	**Students Affected**
CSMP (1975)	Math, problem solving (I)	220	16,734
HOTS (1984)	Higher-level thinking skills (I) (Chapter 1)	About 300	9,000
ICE (1975)	Creative thinking (I)	130	9,686
KIDS Kits (1976)	Self-directed learning (I)	499	106,074
Sage (1981)	Higher-level thinking skills (I) (Gifted and talented)	709	29,790
Talents Unlimited (1971)	Critical thinking (I)	1,364	210,691
CoRT (1970)	Critical, creative, constructive thinking (S)	About 1,500 school districts	information unavailable
Instrumental Enrichment	Mental operation (S)	information unavailable	information unavailable
Philosophy for Children	Reasoning/ethics (S)	270	44,481
SOI (1974)	Learning process (S)	About 50,000 students worldwide	

For more information, contact:

CSMP. Clare Heidema, Director, CSMP, Dept. L90, 12500 E. Iliff Ave., Suite 201, Arvada, CO 80014. (303) 337-0990

HOTS. Dr. Stanley Pogrow, University of Arizona, College of Education, Dept. L90, Tucson, AZ 85721. (602) 621-1305

ICE. Monika Steinberg, Director, Institute for Creative Education, Educational Information and Resource Center, Dept. L90, 700 Hollydell Ct., Sewell, NJ 08080. (609) 582-7000

KIDS Kits. Jo Ann C. Petersen, Warden Elementary School, Dept. L90, 7840 Carr Dr., Arvada, CO 80005. (303) 423-1227

Sage. Sandy Cymerman, Disseminator, Project Sage, Cameron School, Framingham Public Schools, Dept. L90, Elm St., Framingham, MA 01701. (508) 626-9190/626-9134

Talents Unlimited. Dr. Deborah Hobbs, Talents Unlimited, Dept. L90, 1107 Arlington St., Mobile, AL 36605. (205) 690-8060

CoRT. Christine Maxwell, CoRT Director, Science Research Associates, Dept. L90, 2030 Addison St., Suite 400, Berkeley, CA 94704. (415) 841-7715

Instrumental Enrichment. Frances Link, Director, Instrumental Enrichment, Curriculum Development Associates, Inc., Suite 414, Dept. L90, 1211 Connecticut Ave., NW, Washington, DC 20036. (202) 293-1760

Philosophy for Children. Dr. Matthew Lipman, Director, Institute for the Advancement of Philosophy for Children, Dept. L90, Montclair State College, Upper Montclair, NJ 07043. (201) 893-4277

SOI. Dr. Mary Meeker, SOI Systems, Dept. L90, 45755 Goodpasture Rd., Vida, OR 97488. (503) 896-3936

—R Baum

ONE PROGRAM IN ACTION

BY EDWARD DE BONO

I asked a class of 12-year-olds in Sydney, Australia, what they thought of the idea of the school giving every student $5 a week to attend. All 30 students said it was an excellent idea. They said they could use the money to buy sweets, comics, chewing gum, and so on.

I then took 4 minutes to explain the PMI tool. (PMI is one of 60 strategies in my CoRT program. It helps students systematically consider the "plus," "minus," and "interesting" points of an idea.)

Next, I divided the students into groups of five and asked them to think about the P, the M, and the I of my proposal. We brainstormed again. The plus points were the same as before. But now the kids added many minus points: older students would beat them up for the money; parents wouldn't give them presents anymore, and so on. And they thought of many interesting points, too. For example, would the money be used to ensure discipline?

Finally, I asked the original question again. Now 29 of the 30 felt that giving $5 a week to students was a bad idea.

All it took for the students to think objectively about the idea was the 4 minutes I spent explaining the PMI tool. I didn't argue with the students. I didn't ask them for ideas about getting the money. I didn't tell them how other students had reacted. I simply presented the tool, and the students used it on their own.

Tips for using the PMI

- To introduce the PMI for the first time, assign a simple task. You might ask younger students to draw a new design for the human head. Choose one student's idea—for instance, an eye at the back of the head—and ask the class for the "good," "bad," and "interesting" points about that idea. Then explain the PMI tool.
- Cover three to five thinking tasks in each lesson. (For example: All cars should be painted yellow. People should wear a badge showing their mood.)
- Throughout the lesson, use the PMI letters and reiterate what they stand for. This will establish the technique as a deliberate mental operation, not just an attitude.

Adapted, with permission, from *"The Direct Teaching of Thinking in Education and the CoRT Method,"* to be published this year by Pergamon Press in the proceedings of the Organization for Economic Co-Operation and Development Conference, *"The Curriculum Redefined: Learning to Think, Thinking to Learn."*

Edward de Bono, an internationally known authority on thinking and creativity, is the author of 27 books. He developed the CoRT approach to teaching thinking skills (see "10 Top Programs," p. 51).

OTHER PROGRAMS OF NOTE

- **Basics** (critical thinking, preschool to adult). Contact: ICI Services Ltd., Dept. L90, 301 S. 3rd St., Coshocton, OH 43812. (614) 622-5341
- **Building Thinking Skills** (critical thinking, elementary and secondary grades). Contact: Midwest Publications, Dept. L90, P.O. Box 448, Pacific Grove, CA 93950-0448. (408) 375-2455
- **California Writing Project** (critical thinking through writing, all grades). Contact: Carol Booth Olson, UCI Writing Project, Office of Teacher Education, University of California at Irvine, Dept. L90, Irvine, CA 92717. (714) 856-5922
- **Creative Problem Solving** (creative thinking, middle and secondary grades). Contact: Creative Education Foundation, Dept. L90, 437 Franklin St., Buffalo, NY 14202. (716) 675-3181
- **Decision-Making Math** (NDN, grades 7–9). Contact: Laura Dunn, Education and Technology Foundation, Dept. L90, 4655 25th St., San Francisco, CA 94114. (415) 824-5911
- **IMPACT** (NDN, critical thinking, kindergarten to college). Contact: Dr. S. Lee Winocur, National Director, IMPACT, Center for the Teaching of Thinking, Dept. L90, 21412 Magnolia St., Huntington Beach, CA 92646. (714) 964-3106
- **Junior Great Books** (thinking skills through literature, grades 2–12). Contact: The Great Books Foundation, Dept. L90, 40 E. Huron St., Chicago, IL 60611. (800) 222-5870
- **Odyssey** (general thinking skills, middle grades). Contact: Charles Bridge Publishing, Dept. L90, 85 Main St., Watertown, MA 02172. (617) 926-0329
- **Paideia Group** (Socratic method, all grades). Contact: Institute for Philosophical Research, Dept. L90, 101 E. Ontario St., Chicago, IL 60611. (312) 337-4102
- **Project Success Enrichment** (NDN, gifted & talented, grades 2–8). Contact: Carolyn Gaab-Bronson, Station III, Dept. L90, P.O. Box 61100, Seattle, WA 98121. (206) 325-5418
- **Teaching Decision Making with Guided Design** (upper elementary to college). Contact: The Center for Guided Design, Engineering Science Building, Dept. L90, West Virginia University, Morgantown, WV 26506-6101. (304) 293-3445
- **Think Program** (critical thinking, elementary and secondary grades). Contact: Innovative Sciences, Dept. L90, Park Square Station, P.O. Box 15129, Stamford, CT 06901. (203) 359-1311

Programs marked "NDN" have been validated by the Department of Education's National Diffusion Network, which shares successful education programs among schools. NDN programs have been field-tested.

—R. Baum

MORE RESOURCES

The following references provide background that can help you plan and create thinking-skills lessons for any grade level.

- *Creative Problem Solving: The Basic Course* by Scott G. Isaksen and Donald J. Treffinger (Bearly Limited, Buffalo, N.Y., 1985)
- *Developing a Thinking Skills Program* by Barry K. Beyer (Allyn and Bacon, 1988)
- *Developing Minds: A Resource Book for Teaching Thinking*, edited by Arthur L. Costa (ASCD, 1985)
- *Practical Strategies for the Teaching of Thinking* by Barry K. Beyer (Allyn and Bacon, 1987)
- *Practical Thinking Handbook, K–3* (1987) and *Critical Thinking Handbook: 6th–9th Grades* (1989) by Richard Paul et al. (Center for Critical Thinking and Moral Critique, Sonoma State University, Rohnert Park, CA 94928)
- *The Schoolwide Enrichment Model: A Comprehensive Plan for Educational Excellence* by Joseph S. Renzulli and Sally M. Reis (Creative Learning Press, 1985, P.O. Box 320, Mansfield Center, CT 06250)
- *Six Thinking Hats* by Edward de Bono (International Center for Creative Thinking, 1990, 805 W. Boston Post Rd., P.O. Box 774, Mamaroneck, NY 10543)
- *Teaching Thinking and Reasoning Skills* by Robert A. Pauker (AASA, 1987)
- *Teaching Thinking: Issues and Approaches* by Robert J. Swartz and David N. Perkins (Midwest Publications, 1989, P.O. Box 448, Pacific Grove, CA 93950)
- *Thinking and Learning* by Lawrence F. Lowery (Midwest Publications, 1989)

A PUBLICATION FOR YOUNG THINKERS

Think, Inc., is a monthly newsletter for children grades 4–6. It concentrates on one topic each issue, ties the topic to real-life applications, and challenges thinking. A 12-month subscription (with a "literature based teaching guide" for each issue) is $24. P.O. Box 5275, L90, Arvada, CO 80005.

COMPETITIONS

Future Problem Solving Program

The Future Problem Solving Program applies a multistep process to generate solutions to problems of the future. In teams of four, students (grades 4–12) tackle topics like UFOs, ocean communities, robotics, nuclear war, prisons, lasers, nuclear waste, genetic engineering, the greenhouse effect, drunk-driving education, and the militarization and industrialization of space. The teams, which are supervised by teacher-coaches, submit work to state competitions. The best are invited to a state bowl; the state champions advance to a national bowl each spring. Contact: Dr. Anne Crabbe, Director, Future Problem Solving Program, Dept. L90, St. Andrews College, Laurinburg, NC 28352. (919) 276-8361

INVENT AMERICA

Sponsored by the United States Patent Model Foundation, INVENT AMERICA encourages creativity and productivity by developing children's problem-solving and analytical skills. Children in grades K–8 participate in state, regional, and national invention competitions with grants and awards for students, teachers, and schools. Regional winners are brought to Washington, D.C., each year to participate in "INVENT AMERICA! Week." Contact: INVENT AMERICA, Dept. L90, P.O. Box 50784, Washington, DC 20004. (202) 723-1836

Mathematical Olympiads for Elementary Schools (MOES)

MOES, a nonprofit public foundation, sponsors five national problem-solving contests during the school year, starting in November. The problems focus on important mathematical concepts, strategies for problem solving, creativity, resourcefulness, and ingenuity. Schools participate by entering teams. Contact: Dr. George Lenchner, MOES, Dept. L90, P.O. Box 190, Old Westbury, NY 11568. (516) 333-3413

Odyssey of the Mind (OM)

OM sponsors creative problem-solving competitions at the local and state levels. State champions, along with teams from several foreign countries, are invited to the world finals, which take place in late May or early June each year. OM is known for its unique construction problems but also includes challenges that require writing, history, geography, and performing and creative arts. There are three divisions: elementary, middle, and high school. Teacher-coaches receive training at the state level. Contact: OM Association, Inc., Dept. L90, P.O. Box 27, Glassboro, NJ 08028. (609) 881-1603

Science Olympiad

Science Olympiad sponsors tournaments at the intramural, district, regional, state, and national levels for both individual and team events. The competitions, which follow the format of popular board games, TV shows, and Olympic games, cover a variety of disciplines: biology, earth science, chemistry, physics, computers, and technology. There are four divisions: early elementary school (K–2), elementary school, middle school, and high school. Contact: Science Olympiad, Dept. L90, 5955 Little Pine Lane, Rochester, MI 48064. (313) 651-4013

—R. Baum

FINISHING TOUCHES

Learning 90
February Issue
Volume 18, Number 6

10 Top Programs

BY ROBERT BAUM

TO HELP YOU AND YOUR SCHOOL MAKE A SOUND DEcision on which program or programs to undertake, 10 of the best are reviewed here. These 10 span the breadth of options, and reviewing them will allow you to consider two basic issues:

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INFUSED PROGRAMS

Comprehensive School Mathematics Program (CSMP) (NDN)
CSMP is an elementary-level mathematics curriculum focusing on classification, elementary logic, and number theory. Children move through problem-solving sequences in gamelike and storylike settings relevant to their age and interests. The program uses computers, calculators, and geometry models to pose problems, explore concepts, develop skills, and define new ideas. CSMP is adaptable for whole-group, small-group, and individualized instruction. The program requires 2 to 5 days of training.
From the field: *Dean Pedersen, director of curriculum services, Poudre R-1 School District, Fort Collins, Colo.*—I don't know if CSMP is a math program that teaches thinking skills or a thinking-skills program that teaches math! My district selected this program because our students could do basic functions—addition, subtraction, multiplication, and division—but couldn't solve more complex problems.

Implementing CSMP is complicated, however. It requires applying new approaches daily. You'll need the full backing of your staff.

Higher Order Thinking Skills (HOTS) (NDN)
HOTS, a computer lab pullout program for Chapter 1 elementary students, is based on the idea that mastery of basic skills isn't a prerequisite for engaging in higher-order thinking activities. In fact, HOTS uses sophisticated thinking skills to improve basic skills. It also emphasizes building self-confidence. Teachers attend a 1- to 2-week training workshop to learn to meld computer skills with Socratic coaching techniques.
From the field: *Ted Mrak, Chapter I elementary school teacher, Altar Valley School District, Tucson, Ariz.*—I become a hot-air-balloon pilot—complete with goggles, scarf, flight cap, and leather jacket—to get my students excited about *Riding the Wind* (Scholastic Microzine), a computer simulation of a balloon race. The students usually crash early on. But after many crashes, they learn to read their gauges, their altimeter, and the direction and speed indicators. Before returning to the computer, the students must plot strategies for winning the race. Afterward, we discuss their approaches and results.

The message of the '70s was 'back to basics.' In the '80s thinking became one of the basics.

Institute for Creative Education (ICE) (NDN)
ICE is a creative problem-solving process. The program was NDN-approved for whole-classroom use in grades 4–6 (although a full K–12 curriculum subsequently evolved). It develops students' abilities to respond to problems more fluently, flexibly, originally, and elaborately. Teachers receive curriculum materials at a 2-day training workshop.
From the field: *Carol Kalp, 1st-grade teacher, Center Grove School, Randolph, N.J.*—My 1st graders love ICE. Its basic brainstorming and categorizing activities let their minds whirl like never before and then help them organize their world. Take the poem "Widget." Each child imagines what a widget might be. The brainstorming promotes creative, abstract thinking. The class looks for the most unusual responses and then categorizes them. I incorporate the ICE principles throughout the curriculum and do an independent ICE activity with my students at least once a week.

Kids Interest Discovery Studies Kits (KIDS Kits) (NDN)
KIDS Kits generate active, self-directed learning and higher-level thinking. Teachers and library media staff develop kits on topics such as Indians, astronomy, the body, local history, and drug abuse, based on a schoolwide survey of student interests. A program coordinator needs about 6 hours of training.
From the field: *Mary Lee Moore, director of media services, Chatham County schools, N.C.*—KIDS Kits give students access to a wide variety of media that they might not otherwise have a chance to use. The kits contain books, filmstrips, tapes, models, study prints, computer software, and so on; they're suitable for all grade levels, a variety of learning styles, and a wide range of abilities. The strength of the program depends on the teachers working as a team under the media center coordinator.

Sage
This program, designed for gifted elementary students, develops higher-level thinking skills through extending the regular curriculum. Thinking-skills development, mini study units, and independent study are incorporated. A 2-day teacher training workshop is recommended.
From the field: *Margaret Trundy, elementary gifted and talented teacher, Framingham School System, Framingham, Mass.*—Sage is neither acceleration nor enrichment. It's a program of differentiation. It emphasizes abstract thinking. I'm a more creative, flexible thinker because of the children in the Sage program. We're learning from each other.

Don't be lulled into believing that thinking-skills programs are frivolous. Children need to be challenged like this or they'll turn off.

Talents Unlimited (TU) (NDN)
TU is content-oriented and designed for elementary school students at all ability levels. The program helps students develop multiple thinking skills (called "talents"). These skills include productive thinking, commu-

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nicating, planning, forecasting, and decision making as they relate to academic subjects. Two days of training are required.

From the field: *Pat Thomas, kindergarten teacher, Lockwood Elementary School, Clovis, N.M.*—My district is using TU because the lessons fit easily into the curriculum. I apply TU everywhere—to reading, science, math, and history. One of my students told me, "TU makes us think—it *really* makes us think."

I've been using TU for 7 years. I advise teachers to begin easy and let the process flow. Don't force it.

SEPARATE PROGRAMS

CoRT (Cognitive Research Trust)

CoRT is an all-inclusive program that involves critical, creative, and constructive thinking. The program is made up of 60 lessons (15 minutes each) for use over a 3-year period. CoRT can be used with students of any age. Teacher training involves two weekend seminars.

From the field: *Teresa Casarez, 3rd-grade teacher, St. John of God Elementary School, Norwalk, Calif.*—CoRT helps my students (two-thirds of whom are Hispanic) increase their productivity and improve their coping skills for the world outside school, where they are a minority.

The children learn to consider the consequences of their actions. The program also helps them expand their perspective, solve problems, organize information, ask questions, and apply thinking to decision making.

Instrumental Enrichment (IE)

IE is a cluster of problem-solving tasks and exercises that improves students' ability to learn. It's aimed at students in upper elementary, middle, and high school. IE is designed to be taught for a full period, 2 to 5 days per week, for a 2- to 3-year sequence. Teacher training involves a minimum of 45 hours.

From the field: *Annie Tauberg, 7th-grade English teacher, George Washington Middle School, Ridgewood, N.J.*—Today I overheard a student applying an IE principle out loud during a grammar lesson: "Let's see, first I have to determine what kind of verb I have, linking or action." IE calls this "transfer and bridging"—infusing the lessons into other curricular areas.

My students have become more deliberate in their thinking because of IE. They're better problem-solvers.

Philosophy for Children (NDN)

Philosophy for Children transforms the classroom into a community of inquiry delving into the themes of novels written especially for the program. Themes include truth, beauty, fairness, justice, freedom, authority, education, and other personal and social issues that involve ethical decision making. The program requires three 40-minute periods per week. There's a 3-day introductory seminar, but on-site teacher training programs may extend 2 years.

From the field: *Patrick Dugan, 3rd-grade teacher, University City Public School System, St. Louis, Mo.*—During the national smoke-out 2 years ago, I was sitting on the floor having a discussion with the kids. I took out a cigarette, lit it, and started smoking. This quickly got the students into the discourse. "Why are you smoking?" one child asked. "That makes me sick." Our debate proceeded from there.

Philosophy for Children teaches elementary school children to apply logic to their daily lives. The program improves their reasoning ability and creativity by stressing reading comprehension and discussion of ideas.

PROGRAM BUYER'S CHECKLIST

BY DEBORAH E. BURNS AND RICHARD OLENCHAK

Can you answer yes to the following questions about the thinking-skills program you're considering for your classroom?

☐ *Is a list of the thinking skills, their definitions, and a scope and sequence included?*

☐ *Does the program provide a strong, motivating introductory activity?*

☐ *Are there suggestions on how the teacher can model the skills so that they relate to real-life situations?*

☐ *Are the steps or components of each skill explained and broken down into small, easily mastered steps?*

☐ *Does the program provide enough practice activities—including activities that give students a chance to use the skill in different contexts?*

☐ *Does the program list common trouble spots and provide suggestions for evaluating students' work?*

Dr. Richard Olenchak teaches in the gifted and talented program and researches thinking skills at the University of Alabama. Dr. Deborah Burns teaches in the gifted program at the University of Connecticut.

Structure of Intellect (SOI)

SOI identifies 90 different thinking skills, ranging from basic, foundation-level skills to advanced, higher-order skills. Designed for any age and ability level, the program emphasizes reasoning as the key component for successful learning. Teachers are trained to diagnose student weaknesses and apply remedial activities.

The program requires a 2-day teacher development seminar. Because SOI materials call for specific methodology, teachers must upgrade their training on a regular basis.

From the field: *Rabbi Joseph Cherns, educational director, Yeshiva Day School in Lincoln Park, Yonkers, N.Y.*—SOI helps us address students' individual abilities and learning styles. With the SOI test results, we can pinpoint student weaknesses, then plan an attack integrating SOI materials into the curriculum. All our students have been SOI tested.

This is not an easy model to understand. Teachers must be dedicated. But the results make the program worth the work. ♣

Robert Baum is the former managing editor of Gifted Children Monthly and a former classroom teacher in New Jersey.

10 TOP PROGRAMS AT A GLANCE

Program (year founded)	**Emphasis** (Infused Separa	**School Adoptions**	**Students Affected**
CSMP (1975)	Math problem solving (I)	220	16 734
HOTS (1984)	Higher-level thinking skills (I) (Chapter 1)	About 300	9 000
ICE (1975)	Creative thinking (I)	130	9 686
KIDS Kits (1976)	Self-directed learning (I)	499	106 074
Sage (1981)	Higher-level thinking skills (I) (Gifted and talented)	709	29 790
Talents Unlimited (1971)	Critical thinking (I)	1 364	210 691
CoRT (1970)	Critical, creative, constructive thinking (S)	About 1 500 school districts	information unavailable
Instrumental Enrichment	Mental operation (S)	information unavailable	information unavailable
Philosophy for Children	Reasoning/ethics (S)	270	44 481
SOI (1974)	Learning process (S)	About 50 000 students worldwide	

For more information, contact:

CSMP. Clare Heidema, Director, CSMP, Dept. L90, 12500 E. Iliff Ave., Suite 201, Aurora, CO 80014. (303) 337-0990.

HOTS. Dr. Stanley Pogrow, University of Arizona, College of Education, Dept. L90, Tucson, AZ 85721. (602) 621-1305.

ICE. Monika Steinberg, Director, Institute for Creative Education, Educational Information and Resource Center, Dept. L90, 700 Hollydell Ct., Sewell, NJ 08080. (609) 582-7000.

KIDS Kits. Jo Ann C. Petersen, Warden Elementary School, Dept. L90, 7840 Carr Dr., Arvada, CO 80005. (303) 423-1227.

Sage. Sandy Cymerman, Disseminator, Project Sage, Cameron School, Framingham Public Schools, Dept. L90, Elm St., Framingham, MA 01701. (508) 626-9190/626-9134.

Talents Unlimited. Dr. Deborah Hobbs, Talents Unlimited, Dept. L90, 1107 Arlington St., Mobile, AL 36605. (205) 690-8060.

CoRT. Christine Maxwell, CoRT Director, Science Research Associates, Dept. L90, 2030 Addison St., Suite 400, Berkeley, CA 94704. (415) 841-7715.

Instrumental Enrichment. Frances Link, Director, Instrumental Enrichment, Curriculum Development Associates, Inc., Suite 414, Dept. L90, 1211 Connecticut Ave., NW, Washington, DC 20036. (202) 293-1760.

Philosophy for Children. Dr. Matthew Lipman, Director, Institute for the Advancement of Philosophy for Children, Dept. L90, Montclair State College, Upper Montclair, NJ 07043. (201) 893-4277.

SOI. Dr. Mary Meeker, SOI Systems, Dept. L90, 45755 Goodpasture Rd., Vida, OR 97488. (503) 896-3936.

—R Baum

ONE PROGRAM IN ACTION

BY EDWARD DE BONO

I asked a class of 12-year-olds in Sydney, Australia, what they thought of the idea of the school giving every student $5 a week to attend. All 30 students said it was an excellent idea. They said they could use the money to buy sweets, comics, chewing gum, and so on.

I then took 4 minutes to explain the PMI tool. (PMI is one of 60 strategies in my CoRT program. It helps students systematically consider the "plus," "minus," and "interesting" points of an idea.)

Next, I divided the students into groups of five and asked them to think about the P, the M, and the I of my proposal. We brainstormed again. The plus points were the same as before. But now the kids added many minus points: older students would beat them up for the money, parents wouldn't give them presents anymore, and so on. And they thought of many interesting points, too. For example, would the money be used to ensure discipline?

Finally, I asked the original question again. Now 29 of the 30 felt that giving $5 a week to students was a bad idea.

All it took for the students to think objectively about the idea was the 4 minutes I spent explaining the PMI tool. I didn't argue with the students. I didn't ask them for ideas about getting the money. I didn't tell them how other students had reacted. I simply presented the tool, and the students used it on their own.

Tips for using the PMI

- To introduce the PMI for the first time, assign a simple task. You might ask younger students to draw a new design for the human head. Choose one student's idea—for instance, an eye at the back of the head—and ask the class for the "good," "bad," and "interesting" points about that idea. Then explain the PMI tool.
- Cover three to five thinking tasks in each lesson. (For example: All cars should be painted yellow. People should wear a badge showing their mood.)
- Throughout the lesson, use the PMI letters and reiterate what they stand for. This will establish the technique as a deliberate mental operation, not just an attitude.

Adapted with permission from "The Direct Teaching of Thinking in Education and the CoRT Method," to be published this year by Pergamon Press in the proceedings of the Organization for Economic Co-Operation and Development Conference "The Curriculum Redefined: Learning to Think, Thinking to Learn."

Edward de Bono, an internationally known authority on thinking and creativity, is the author of 27 books. He developed the CoRT approach to teaching thinking skills (see "10 Top Programs," p. 51).

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OTHER PROGRAMS OF NOTE

- **Basics** (critical thinking, preschool to adult). Contact: IO Services Ltd., Dept. L90, 301 S. 3rd St., Coshocton, OH 43812. (614) 622-5341.
- **Building Thinking Skills** (critical thinking, elementary and secondary grades). Contact: Midwest Publications, Dept. L90, P.O. Box 448, Pacific Grove, CA 93950-0448. (408) 375-2455.
- **California Writing Project** (critical thinking through writing, all grades). Contact: Carol Booth Olson, UCI Writing Project, Office of Teacher Education, University of California at Irvine, Dept. L90, Irvine, CA 92717. (714) 856-5922.
- **Creative Problem Solving** (creative thinking, middle and secondary grades). Contact: Creative Education Foundation, Dept. L90, 437 Franklin St., Buffalo, NY 14202. (716) 675-3181.
- **Decision-Making Math** (NDN, grades 7–9). Contact: Laura Dunn, Education and Technology Foundation, Dept. L90, 4655 25th St., San Francisco, CA 94114. (415) 824-5911.
- **IMPACT** (NDN, critical thinking, kindergarten to college). Contact: Dr. S. Lee Winocur, National Director, IMPACT Center for the Teaching of Thinking, Dept. L90, 21412 Magnolia St., Huntington Beach, CA 92646. (714) 964-3106.
- **Junior Great Books** (thinking skills through literature, grades 2–12). Contact: The Great Books Foundation, Dept. L90, 40 E. Huron St., Chicago, IL 60611. (800) 222-5870.
- **Odyssey** (general thinking skills, middle grades). Contact: Charles Bridge Publishing, Dept. L90, 85 Main St., Watertown, MA 02172. (617) 926-0329.
- **Paideia Group** (Socratic method, all grades). Contact: Institute for Philosophical Research, Dept. L90, 101 E. Ontario St., Chicago, IL 60611. (312) 337-4102.
- **Project Success Enrichment** (NDN, gifted & talented, grades 2–8). Contact: Carolyn Gaab-Bronson, Station III, Dept. L90, P.O. Box 61100, Seattle, WA 98121. (206) 325-5418.
- **Teaching Decision Making with Guided Design** (upper elementary to college). Contact: The Center for Guided Design, Engineering Science Building, Dept. L90, West Virginia University, Morgantown, WV 26506-6101. (304) 293-3445.
- **Think Program** (critical thinking, elementary and secondary grades). Contact: Innovative Sciences, Dept. L90, Park Square Station, P.O. Box 15129, Stamford, CT 06901. (203) 359-1311.

Programs marked "NDN" have been validated by the Department of Education's National Diffusion Network, which shares successful education programs among schools. NDN programs have been field-tested.

—R. Baum

COMPETITIONS

Future Problem Solving Program
The Future Problem Solving Program applies a multistep process to generate solutions to problems of the future. In teams of four, students (grades 4–12) tackle topics like UFOs, ocean communities, robotics, nuclear war, prisons, lasers, nuclear waste, genetic engineering, the greenhouse effect, drunk-driving education, and the militarization and industrialization of space. The teams, which are supervised by teacher-coaches, submit work to state competitions. The best are invited to a state bowl; the state champions advance to a national bowl each spring. Contact: Dr. Anne Crabbe, Director, Future Problem Solving Program, Dept. L90, St. Andrews College, Laurinburg, NC 28352. (919) 276-6381.

INVENT AMERICA
Sponsored by the United States Patent Model Foundation, INVENT AMERICA encourages creativity and productivity by developing children's problem-solving and analytical skills. Children in grades K–8 participate in state, regional, and national invention competitions with grants and awards for students, teachers, and schools. Regional winners are brought to Washington, D.C., each year to participate in "INVENT AMERICA! Week." Contact: INVENT AMERICA, Dept. L90, P.O. Box 50784, Washington, DC 20004. (202) 723-1838.

Mathematical Olympiads for Elementary Schools (MOES)
MOES, a nonprofit public foundation, sponsors five national problem-solving contests during the school year, starting in November. The problems focus on important mathematical concepts, strategies for problem solving, creativity, resourcefulness, and ingenuity. Schools participate by entering teams. Contact: Dr. George Lenchner, MOES, Dept. L90, P.O. Box 190, Old Westbury, NY 11568. (516) 333-3413.

Odyssey of the Mind (OM)
OM sponsors creative problem-solving competitions at the local and state levels. State champions, along with teams from several foreign countries, are invited to the world finals, which take place in late May or early June each year. OM is known for its unique construction problems but also includes challenges that require writing, history, geography, and performing and creative arts. There are three divisions: elementary, middle, and high school. Teacher-coaches receive training at the state level. Contact: OM Association, Inc., Dept. L90, P.O. Box 27, Glassboro, NJ 08028. (609) 881-1603.

Science Olympiad
Science Olympiad sponsors tournaments at the intramural, district, regional, state, and national levels for both individual and team events. The competitions, which follow the format of popular board games, TV shows, and Olympic games, cover a variety of disciplines: biology, earth science, chemistry, physics, computers, and technology. There are four divisions: early elementary school (K–2), elementary school, middle school, and high school. Contact: Science Olympiad, Dept. L90, 5955 Little Pine Lane, Rochester, MI 48064. (313) 651-4013.

—R. Baum

MORE RESOURCES

The following references provide background that can help you plan and create thinking skills lessons for any grade level.

- *Creative Problem Solving: The Basic Course* by Scott G. Isaksen and Donald J. Treffinger (Bearly Limited, Buffalo, N.Y., 1985).
- *Developing a Thinking Skills Program* by Barry K. Beyer (Allyn and Bacon, 1988).
- *Developing Minds: A Resource Book for Teaching Thinking* edited by Arthur L. Costa (ASCD, 1985).
- *Practical Strategies for the Teaching of Thinking* by Barry K. Beyer (Allyn and Bacon, 1987).
- *Practical Thinking Handbook: K–3* (1987) and *Critical Thinking Handbook: 6th–9th Grades* (1989) by Richard Paul et al. (Center for Critical Thinking and Moral Critique, Sonoma State University, Rohnert Park, CA 94928).
- *The Schoolwide Enrichment Model: A Comprehensive Plan for Educational Excellence* by Joseph S. Renzulli and Sally M. Reis (Creative Learning Press, 1985, P.O. Box 320, Mansfield Center, CT 06250).
- *Six Thinking Hats* by Edward de Bono (International Center for Creative Thinking, 1990, 805 W. Boston Post Rd., P.O. Box 774, Mamaroneck, NY 10543).
- *Teaching Thinking and Reasoning Skills* by Robert A. Pauker (AASA, 1987).
- *Teaching Thinking: Issues and Approaches* by Robert J. Swartz and David N. Perkins (Midwest Publications, 1989, P.O. Box 448, Pacific Grove, CA 93950).
- *Thinking and Learning* by Lawrence F. Lowery (Midwest Publications, 1989).

A PUBLICATION FOR YOUNG THINKERS

Think, Inc., is a monthly newsletter for children grades 4–6. It concentrates on one topic each issue, ties the topic to real-life applications, and challenges thinking. A 12-month subscription (with a "literature based teaching guide" for each issue) is $24. P.O. Box 5275, L90, Arvada, CO 80006.

WINTER, 1990, VOL. 13, NO. 2
Journal for the Education of the Gifted

Journal for the Education of the Gifted VOL. 13, No. 2

Journal for the Education of the Gifted
The University of North Carolina Press
Post Office Box 2288
Chapel Hill, NC 27515-2288
ISSN 0162-3532

Return Postage Guaranteed

Application for
Second Class
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Chapel Hill, NC and
additional office

NDN: An Outlet for Exemplary Programs

Anna Luhman & Kathy A. Michels

The National Diffusion Network was established to act as an outlet for exemplary programs to be implemented in schools nationwide. The legislative foundations and operations of the National Diffusion Network are discussed. Several of the programs for the gifted that are recognized by the National Diffusion Network are described and a source for further information is provided.

As educators and people generally interested in the gifted population, we have come to realize that giftedness, like any other exceptionality, is a multifaceted state of being. To educate these special people we must meet their needs, recognize their strengths and weaknesses, and promote an environment conducive to their learning. The development of a program that can function in such a complete manner and meet the entire realm of needs characteristic of gifted children is unlikely. Consequently, the development of a variety of programs that focus on individual aspects of gifted education have been indentified as educational programs that work by the U.S. Department of Education. These proven exemplary practices have been developed by educators in the field who are required to submit statistically significant data at the .05 or .01 level or to submit especially well conducted case studies or other qualitative information in order to receive national validation. Once approved they are eligible to become a part of a network that is a program of the U.S. Department of Education, entitled the National Diffusion Network (NDN), and are available for replication nationwide.

A dynamic and motivated teacher in an elementary school in rural America may develop a program for the gifted that empirically shows effectiveness. Such a program may also be beneficial to other rural schools and perhaps even to urban educational facilities with some modification. Local education agencies across the country

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Journal for the Education of the Gifted. Vol. 13, No. 2, 1990, pp. 156-167. Copyright ©1990, The Association for the Gifted, Reston, Virginia 22091.

may be in need of information on possible programs to implement that are centered on specific populations and/or subjects that can provide improvement to the existing curriculum. For the past fourteen years, this vital programmatic task has been the central thrust of the NDN component of the U.S. Department of Education.

NDN

The NDN began operations in 1974 to provide schools nationwide with effective educational practices and programs. By identifying exemplary innovative and effective programs, bringing them to the attention of educators, and providing materials and training for implementation, the process of program diffusion is facilitated. The NDN operates on many levels and in diverse settings. For example, NDN implements these exemplary programs primarily on the local educational level; however, intermediate education agencies such as universities and private organizations have also become sites of NDN programs. The population served by these programs ranges from preschoolers to adults.

The selected exemplary education programs are usually developed by practitioners in local schools over a period of several years. The majority of the programs provide teachers with diagnostic and instructional tools to use in the classroom. Some programs, however, are directed toward administrative practices and inservice training. All NDN programs have been reviewed by specialists on the Program Effectiveness Panel, or PEP (formerly the Joint Dissemination Review Panel, or JDRP), that requires documented statistical evidence of effectiveness, namely empirical data supporting the program's exportability and cost effectiveness.

NDN is a funding organization consisting of four categories of agents: Developer/Demonstrators, State Facilitators, Dissemination Process Projects, and a Private School Facilitator. The Developer/Demonstrators (D/D's), many times at the local school district levels, are creators of the exemplary programs. They are responsible for providing materials and training necessary for implementation at sites throughout the country. They also provide demonstration sites where the active program can be observed so other schools can decide on an adoption and observe implementation procedures and determine if a program meets their needs. The D/D's construct the detailed plans, and conduct training of staff, monitor and evaluate the adoption process, coordinate with NDN State

Facilitators, and oversee the general functioning and implementation of the program adoption.

State Facilitators make up the second category of agents. These people are responsible for informing interested educational groups about NDN D/D programs. They assess the programmatic needs of each school and/or district in their state and match those needs with appropriate NDN programs. Following the program awareness stage, the facilitator acts as a link between interested schools/districts and D/D's to observe, choose, and adopt a program. Adopter schools, staff and/or districts that develop quality replications can then become certified demonstration sites and trainers, therefore receiving recognition at the national level.

The third category, Dissemination Process Projects, currently consists of three projects funded by the NDN. These grants were awarded to national organizations that disseminate a variety of materials and services in a single content area (Wickline, 1988).

The fourth category of agents, a Private School Facilitator, was developed to work with private schools and State Facilitators to initialize NDN programs in private schools throughout the country. One Private School Facilitator is funded to help with the initialization (Wickline, 1988).

The NDN programs are funded by the U.S. Department of Education by competitive grants and are targeted towards 16,000 local school districts (Weinheimer, 1983). Facilitators and D/D's are the recipients of the funds, although several D/D's participate in the Network without NDN funding. The cost of implementing the programs is negotiated by the adopter site, D/D and State Facilitator. The program developer determines the cost of the program, and the adopting sites share the costs attached to the adoption with the state facilitator/agency.

Legislative foundations

The first sign of Federal involvement in promoting the development and demonstration of effective programs began in the early 1960's. These attempts, however, were not achieving the original goals by the late 1960's. A new and more direct approach was needed to identify and promote effective programs.

In efforts to directly identify exemplary programs, the Joint Dissemination Review Panel (JDRP) was established in 1973 by the U.S. Department of Education as a means of assuring that quality programs would be disseminated to the educational community nationwide. In 1987, the JDRP became known as the Program Effectiveness Panel (PEP) as a result of reorganization. Also in 1973, moneys from ESEA Title III, a federal demonstration program, became available for federal use. Anticipation of this program's termination made 9 million dollars available for federal use. Then federal program manager, Lee Wickline, and branch chief Jean Narayanan, called a meeting of people associated with the ESEA Title II program to determine how the moneys would be used. After two days of collaborating with experts in the field of educational diffusion, the foundations for NDN were laid. Programs already developed with Title III funds were to be disseminated to new sites, and the JDRP was to serve as a screening agent for the programs. The roles of D/D's and State Facilitators were established along with the guidelines for funding adopter sites. The NDN program was announced to states and local education agencies, and implementation of the NDN strategy began in 1974.

Leadership

The typical top-down hierarchy of leadership is not evident in the NDN. The D/D's and State Facilitators have assumed leadership roles. No particular group has lead for an extended period of time, therefore maintaining a responsive stance to the changing educational needs of the nation. Over the years, different groups have been influential as various issues arose. State agencies made contributions to the organization and function of the program. Internally, this dissemination and evaluation strategy has provided the NDN with a system of checks and balances and a decentralized format.

NDN programs

Since the implementation of the NDN, over 400 programs have been developed and recognized as exemplary practices. The NDN has impacted over 22,000 public and private schools per year (RMC, 1987) in the 50 states, Puerto Rico, and the Virgin Islands, and an estimated 2.7 million students. The 400 programs reflect a variety of exemplary practices developed to meet the diverse educational needs and priority areas of the nation. Gifted education is one of these priority areas.

NDN has approved at least 25 programs specifically for gifted/talented education. The programs range from content specific, i.e. mathematics or computer training, to general applications such as critical thinking skills. Each program is unique. Each program targets a different population and has various functions within a broad spectrum of possibilities. Nine of these programs are included in this article. These programs were chosen based on their generalized applicability to gifted education. Further information on the content specific programs offered are available from NDN, but are not included in this text. Table 1 provides a comparative analysis of these 9 programs. As noted in the table, each program contrasts greatly with the other, leaving only a few points of similarity. A description of each of these programs and the empirical evidence submitted to the JDRP or PEP for approval are provided below.

Among the exemplary programs defined for gifted education are College Studies for the Gifted (CSG), Academically Talented Youth Programs (ATYP), Public and Private School Collaboration, Critical Analysis and Thinking Skills (CATS), Kids Interest Discovery Studies Kits (KIDS KITS), SAGE, Institute for Creative Education (ICE), Talents Unlimited, and Success Enrichment.

The College Studies for the Gifted program provides intellectually, artistically, dramatically, and musically talented students between the ages 10 and 18 the opportunity to participate in science and liberal arts courses and activities at the university/college level. These students interact with intellectual peers, and are challenged in a learning environment outside their school setting. The option to attend college classes full-time, part-time or in conjunction with their regular schooling is available. Program participants work together to form a cohesive group which promote each others personal growth and abilities. Participating students receive counseling to insure their social and emotional adjustment and development. Additional benefits include receiving college credit and credit towards their high school diplomas.

Many of these students graduate from high school and enter college at the sophomore level. The program is transportable to any college campus. Effectiveness has been established using pre and post questionnaires designed specifically for the CSG program. Also all students are asked to complete the Coopersmith Self-Esteem Inventory at the beginning of their participation and at the end. T-test analysis of the results indicate that significant positive changes in self-image, motivation, and peer interaction were demonstrated at the .01 level. Also GPA's are averaged and have remained at a 3.25 level on a 4-point scale over a period of 5 years.

The Academically Talented Youth Program emphasizes mathematics and is targeted toward 7th to 9th grade students who have demonstrated excellent mathematics abilities. The accelerated program seeks to provide appropriate instruction for students in both public and non-public schools. The courses are generally taught by university professors during a two and one half hour course each week during the school year. The first year in the program covers high school Algebra I and II and generally introduces probability and trigonometry principles. A theoretical framework is established for the math problems and concepts. Homogeneous grouping according to ability and age is used for class assignment. The instructors then recommend course grades and credit to the high school from which the students came. Program effectiveness was demonstrated after 88 hours of instruction with content normally requiring 330 hours of instruction.

The Cooperative Mathematics Test was administered to Algebra I and II students who participated in the program and comparative students who were instructed the full 330 hours. T-tests were conducted on the scores to determine statistical significance. No differences in achievement were noted between Algebra I project students and non-project students indicating that one quarter of instruction time resulted in equal achievement levels. The comparison between Algebra II students showed significantly greater achievement in project students than non-project students in one quarter of the time.

The Public and Private School Collaboration program is an effort to provide advanced academic opportunities for urban students and promote enrollment in private facilities. Choate Rosemary Hall has combined efforts with the Connecticut Association of Urban superintendents (CAUS) to sponsor the Connecticut Scholars Program. Ten percent of Connecticut school systems are represented. The population served consists of 25 percent of the state's public school students, 80 percent of the state's minority students, and 82 percent of the state's disadvantaged youth. Instructors come from both the private and public school sectors. Effectiveness was determined from qualitative data derived from questionnaires and interviews from teachers and students.

Results indicate that students obtained improved levels of education and increased positive educational and career plans. Teachers were found to have improved perceptions of themselves in a professional education setting and in the performance of all students. Improved performance through the school year was noted by participants and their peers. The program promotes positive attitudes toward public and private education. The project is characterized by

Table 1

Comparative Analysis of NDN Programs for Gifted*

Program	*Target Population*	*Educational Setting*	*Proof of Effectiveness*	*Service Delivery*	*Areas of Impact*
ATYP	Grades 7 to 9 (Mathematics excellence)	Public/private College	Cooperative Mathematics Test (t-test)	Collaboration (Pull-out)	Instructional time in mathematics Learning time in mathematics
CATS	High School	no specification	Pre/Post measure Rated projects (field test)	Regular Ed modification	Research/writing skills Critical thinking
CSG	10 to 18 years old (Academic, art, drama or music excellence)	Public/private College	Pre/Post Questionnaires Coopersmith Self-Esteem Inventory Grade Point Average	Collaboration (Pull-out or supplemental)	self-image, motivation, interest, peer interaction
ICE	Grades 4 to 6	heterogeneous whole classroom	Torrance Test of Creative Thinking (Forms A & B) (pre/post administration)	Regular Ed Enrichment	Problem solving skills
KIDS KITS	Grades 1 to 8 (all areas of exceptionality)	Elementary—middle school	Interview	Special Ed., Regular Ed., Learning Center	Generalized application Scope, knowledge of educational resources, Awareness (specificity, complexity)
Project Success Enrichment	Grades 4 to 6 (Used 2 to 8)	no specification	Ratings on pre/post samples of poetry, prose, & art works	Pull-out/Resource or Regular Ed	Achievement quality in Art and Writing
Public/Private School Collaboration	Grades 11 to 12	Public-private	Questionnaire and Interview (student & teacher)	Collaborative Enrichment	Level of educational attainment, School performance, teacher of selves & students
SAGE	Grades 1 to 5	no specification	Ross Test of Higher Cognitive Processes, Test of Cognitive Skills, Comprehensive Tests of Basic Skills (form U) Cornell Critical Thinking Test, (Level X)	Differentiated Specialized Curriculum	Critical thinking skill
Talents Unlimited	Grades 1 to 6	Public/private Elementary	Talents unlimited Criterion Reference Tests Torrance Tests of Creative Thinking	Regular Ed modification	Self-image Achievement

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* For information on these programs, contact: National Diffusion Network address given at end of article

eligible students attending a five week residential study in the summer at Choate Rosemary Hall where they receive advanced teachings in the areas of mathematics, science and humanities. Scholarships are provided to absorb the cost of enrollment. The target population consists of 10th and 11th grade students who have demonstrated high academic achievement and motivation.

Critical Analysis and Thinking Skills is a program designed for high school students, but has been implemented with students in lower grades. It is centered around the development of critical thinking skills and then integrated with the analysis of relevant issues. Students participating in CATS are taught to define and evaluate current issues through a well-planned decision-making process. From information obtained through defining and evaluating, students are able to construct persuasive essays discussing their conclusions about the issue. Specific skills contributing to critical thinking, using a six step process, are then used to evaluate the issues further. An ADVANCED CATS project is also currently available for the gifted students. A pre/post test was administered to a control group and project group. Significant gains were noted on a measure of critical thinking skills for project students, but not control students. Independent experts rated in-class research papers of both groups resulting in significantly higher ratings on project student papers.

Kids Interest Discovery Studies Kits utilizes a multimedia approach to a variety of educational populations. Kits containing books, filmstrips, tapes, models, study prints, etc., are constructed by students after a school-wide interest survey. Participants may be from grade 1 to 8 or any ability level. Four phases are followed in the program: (1) exploration, (2) in-depth study, (3) application, and (4) sharing of information. According to interview data the kits have provided participants with greater specificity, complexity, and an increased number of descriptions of the purpose of their studies. The participants also indicated a greater awareness and usage of educational resources and showed generalized applications of the learned material. The data was statistically significant in both the developmental site and two adoptor sites at the .02 level or better. This data and the project apply to all areas of exceptionality.

Program SAGE is targeted toward a younger group of gifted individuals. Students in grades 1–5 are provided a means to develop higher order and critical thinking skills, participate in mini-study units, and independent study. Effectiveness as measured by increased levels of higher order and critical thinking skills was demonstrated utilizing the Ross Test of Higher Cognitive Processes, the Test of Cognitive Skills, Comprehensive Tests of Basic Skills (Form U), and the Cornell Critical Thinking Test. Students participating in project SAGE were compared to comparable gifted students not participating in the program. Participants and nonparticipants were tested at the beginning and end of one school year. The participants made significantly greater gains ($p<.05$) in the areas measured than nonparticipants. Characteristics of the program believed to have contributed to the gains include a mentorship program that encourages the development of thinking skills in the student's area of interest. The program is also believed to have positive implications for the participants regular curriculum which may consequently generalize thinking skills to other areas of study.

Another NDN program that has been effective in both pull-out or whole classroom configurations is the Institute for Creative Education. Using a creative problem solving process based in a variety of subject areas, each sequentially ordered lesson develops student's divergent thinking as well as decision making abilities. The upper level thinking skills are emphasized as the teacher facilitates student's discussions of alternative possibilities in problems or tasks. Students learn in a nonjudgmental atmosphere, how to link ideas with concepts using their own reasoning and discovery skills. Products are developed that may be quickly produced, such as written or oral descriptions of their possible solution, or more complex, such as a three dimensional model of a vehicle that can be propelled on both land and water.

Students develop creativity, a higher level of self-esteem, better oral and written communication skills, broader and more accurate vocabulary skills, increased problem solving abilities, and a higher level of interest in learning. The Torrance Test of Creative Thinking was administered to treatment and control groups in a pre and post-test design. Projects students had improved their critical thinking skills significantly ($p<.05$) as compared to nonproject students. The improvements demonstrated effectiveness and gained NDN approval.

Talents Unlimited is focused on multiple talents and the awareness and nurturing of these talents. Grades 1 through 6 make up the target population. The multiple-talent theory defined by Dr. Calvin Taylor is implemented at the elementary classroom level to deal with talents in the areas of productive thinking, communication, forecasting, decision making, and planning, in addition to the academic areas. Effectiveness was demonstrated when project students outperformed a control group at the .001 level on the Talents Unlimited Criterion Reference Tests and Torrance Tests of Creative Thinking. The Coopersmith Self-Esteem Test also showed that project students had improved self-concepts and increased achievement performance.

Project Success Enrichment has been modeled to benefit gifted and talented students from grades 4 through 8. Students with high ability in language arts (writing and literature) and art (drawing and painting, and sculpting) constitute the original target group, although the curriculum has been used in a variety of education settings. The original pull-out model offered enrichment classes for talented students in addition to their regular classes. Both sections encourage projects to provide practical application of the learned skills. Problem-solving, critical and creative thinking, social and self-management skills are integrated into the programs' structure. The program uses a process-oriented approach to the content areas and the methodology used to deliver the activities include cooperative learning, group process, brainstorming, and shared decision making. Several years of instruction are covered in the curriculum units. Pre- and post-samples of poetry, prose, and art projects were used to determine effectiveness. Project students and nonproject students submitted final products that were rated by experts blind to the identity of the creator. Project students' products were rated better than nonproject students'.

The programs delineated above are only a sample of what is available through NDN. All the programs currently active are participating because they have proven their effectiveness and ability to meet specific educational needs, and therefore achieving the status of exemplary programs. Further information about the programs described here and those offered in other priority areas, i.e. adult education, administration/organizational arrangement, alternative schools/programs/bilingual/migrant, basic skills in language arts/writing, mathematics, multidisciplinary, and reading, career/vocational education, early childhood/parent involvement, health/physical education, preservice/inservice training, science/social science, and special education/learning disabilities, can be obtained through state and regional NDN facilitators or the federal office of the NDN.:

National Diffusion Network
Recognition Division
U.S. Department of Education
OERI/PIP/Recognition Division

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Volume 79 November/December 1985 Number 2

The Effects of a Multiple-Talent Teaching Program

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ABSTRACT **This study examined the effects of Talents Unlimited (TU) teaching on students' productive and creative thinking scores. Data were gathered from 450 first-, second-, and fifth-grade students in six different elementary schools. TU students had statistically significant higher adjusted means on seven of the nine comparisons. The control group had statistically significant higher adjusted means on the other two comparisons. Results were not consistent across grade levels, nor from class to class. Eta-squareds ranged from .01 to .11, and effect sizes ranged from .19 to .74, indicating small to moderate associations between the treatment and the dependent variables. It was concluded that TU instruction, as implemented in this particular study, provided results of questionable educational significance.**

In 1971, a federally funded project called Talents Unlimited (TU) was initiated, based on Taylor's multiple-talent approach to teaching (Taylor, Brewster, Wolfer, Loy, & Bourne, 1964). The intent was to develop a program for teaching five talents (productive thinking, forecasting, decision making, planning, and communicating) to children in the classroom. Procedures for teacher training were also developed. Talents Unlimited has received national recognition as part of the National Diffusion Network and has been highly acclaimed by many teachers who have adopted the approach (Taylor, [illegible]).

The five talents were operationally defined by the TU staff in terms of student behaviors (Talents Unlimited, 1978). Implicit in the TU talent definitions is an emphasis on helping students learn to produce an increasingly greater number of ideas. For example, decision making is defined in terms of the number of alternatives a person gives and the number of reasons given for the final choice. The purpose of the TU program, for decision making, is to give students experience in making decisions in the context of the regular curriculum so that they will be able to produce more alternatives and more reasons for their choices. The assumption is that the production of more ideas will lead to a correspondingly higher number of good ideas from which to choose, to better rationales for decisions, and ultimately to better decision making. While different kinds of ideas are needed for each of the five talents, the same basic rationale (that an increase in the quantity of ideas leads to an increase in the quality of ideas, and thus to talent improvement) is implicit in each of the definitions and in the training procedures.

Evidence from several studies indicates that the production of ideas can be increased through instruction (e.g., Alencar, Feldhusen, & Widlak, 1976; Campbell & Willis, 1978; Cliatt, Shaw, & Sherwood, 1980; Franklin & Richards, 1977; Hicks, 1980; Juntune, 1979; Khatena & Dickerson, 1973; Shively, Feldhusen, & Treffinger, 1972). However, the research reported on the effectiveness of the TU program has been restricted largely to instruction in which only one or two of the talents were introduced to students during a school year (George, 1980; McLean & Chissom, 1980; Schneider, 1978). The results of these studies have consistently supported the effectiveness of the approach.

Only one study has been reported in which all five of the talents were introduced to the students during one school year. That study was carried out by the TU staff in 1974. The results were submitted to the U.S. Office of Education as part of a request for federal acceptance of the project for the National Diffusion Network as an "educational program that works" (U.S. Department of Education, 1981, p. 12–13). The research was summarized by Chissom and McLean (1979). A report of research in which a local school district used TU-trained faculty to instruct other teachers in the TU procedures and implemented the total approach (i.e., provided instruction in all five of the talent areas) in one school year has not been available.

The purpose of this study (Gordon, 1983) was to evaluate the effects of an autonomous implementation of the TU procedures by TU-trained faculty in their local school district. The study was to provide the

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district with evaluation information, as well as address the lack of research evidence about TU effectiveness when implemented across the five areas.

Method

Subjects for this study came from six elementary schools in one school district located in the Ogden, Utah, area. A nonequivalent control group design was selected because the sample came from intact classrooms. The experimental group consisted of all four first-grade classes in School A, all four second-grade classes in School B, and all three fifth-grade classes in School C. These schools were used because a teacher in each, at the respective grade level, had been sent to the TU project in Alabama for training and, after using the approach for a year, was enthusiastic about it. The district superintendent decided to expand use of the approach; to assess treatment effects, central office staff selected control schools comparable in physical facilities, enrollments, and socioeconomic status. Teachers were asked by their principals to participate, and all agreed to do so. The control group consisted of all four first-grade classes in School D, all four second-grade classes in School E, and both fifth-grade classes in School F. Over a period of five consecutive months, 11 experimental and 10 control teachers and 450 students who completed pre- and posttests (236 in the experimental group and 214 in the control group) participated in the study.

The control group students received regular classroom instruction. The control teachers were aware that their students were involved in an experiment but were asked to continue with their normal instructional methods.

The experimental teachers were asked to introduce each talent to their students and then emphasize it for one month. Nine of the 11 experimental teachers had not previously been trained in the Talents Unlimited approach; therefore, the first task was to train them in the TU theory, purposes, and methods. Monthly one-hour inservice training sessions were conducted by the two experimental teachers who had received training at TU headquarters in Mobile, Alabama (the third TU-trained teacher had left the district). Five meetings were held, one for each of the five talents. As a part of the inservice training, the experimental teachers were introduced to the Talent Activity Packet (a manual developed by the TU staff) and were asked to use it as a resource for talent development activities. They were also given instruction and encouragement in creating their own talent development activities for use with their students.

On an anonymous teacher self-report, used to assess the extent to which the TU approach was implemented in the classroom, experimental teachers reported using roughly three to five talent activities per week with the students in their classrooms. However, data from a Student Activity Questionnaire (SAQ) indicated that students may not have perceived differences in classroom activities. The SAQ (Project IMPLODE, 1973), developed for use with fifth and sixth graders to assess perceptions of classroom environment, was administered to the project fifth-grade students. On six of the eight SAQ scales, including a Multiple Talent scale, there was not a statistically significant difference between the experimental and control group means.

Two instruments were used to assess the effects of the teachers' training on students' talent levels—the Multiple Talent Test (Project REACH, n.d.), developed to assess TU outcomes, and the Figural Form of the Torrance Tests of Creative Thinking (Torrance, 1966), a widely accepted general measure of creativity. The Multiple Talent Test (MTT) is comprised of six subtests, two of which are for productive thinking. However, the Productive Thinking-Problem Solving subtest was not used because no attempt was made to teach problem solving either to the teachers or to the children. The five MTT subtests used were (a) productive thinking—imaginary, (b) forecasting, (c) decision making, (d) planning, and (e) communication. Four scores (fluency, flexibility, originality, and elaboration) were obtained from the Torrance Tests of Creative Thinking (TTCT).

The reliability of the MTT and TTCT scores for this study presented perplexing problems. Scale scores based on frequencies of responses to a prompt do not lend themselves to conventional internal consistency estimates of reliability. On the other hand, testing beyond the pre- and posttests to obtain test-retest coefficients did not seem desirable because of the potential effects on results, and resources were not available for a separate reliability study.

The reliability of the TTCT scores was not in serious question because of published evidence of adequate reliability for research purposes (Baird, 1972). However, no reliability coefficients for MTT scores could be found in the literature. As an estimate of score stability, pre- and posttest scores for the control group were correlated. The coefficients for MTT scores were productive thinking, .35; forecasting, .34; decision making, .41; planning, .42; and communication, .40. Coefficients for the TTCT scores over the same five-month interval were similar (fluency, .39; flexibility, .34; originality, .20; and elaboration, .50). When compared with the coefficients obtained by Hagender (1967) for TTCT scores over the more usual retest interval of one to two weeks (.80, .64, .60, and .80, respectively), the coefficients for both TTCT and MTT scores suggest that adequate reliability estimates for research purposes could be expected with a more appropriate—shorter—test-retest interval.

The MTT and TTCT were administered by the teachers in their own classrooms. Forms A and B were used, respectively, for pre- and posttesting. The MTT calls for students to write down their ideas, a task for which first graders are not prepared, especially at the beginning of the school year. Following the recommended procedure (Project REACH, n.d.), the first graders in both the experimental and control groups gave their answers to teacher aides to write down. A teacher aide wrote down the student's title for each first grader's drawing for the TTCT figural form but assisted in no other way, as scoring is done directly from the drawings. The pretest was given in October, before the training began. The posttest was administered in March at the completion of the study.

It was hypothesized that students who received TU instruction would have statistically significant higher means on the talent measures than those who did not receive the instruction. Comparisons of student mean scores by grade level (one, two, or five) were also of interest. Two-way analysis of covariance (COVAR), with the pretest as the covariate, was used to examine the training and grade-level main effects and interactions. Correlations between pre- and posttest scores on the dependent variables ranged from .34 to .50, with the exception of one coefficient, .20, for TTCT originality scores. All were statistically significant ($p < .01$). Homogeneity of regression across treatments was tested using the standard error for Fisher's z transformation. Despite the large sample size, only one difference between coefficients, for the TTCT elaboration scores, was statistically significant at the .05 level. As Winer (1971, p. 772) has indicated, the analysis of covariance is robust with regard to the homogeneity of regression assumption. Nevertheless, the data for TTCT elaboration were also analyzed using analysis of variance (ANOVA). The results were generally consistent with those from the COVAR and will be commented on only where they differ. Differences among the adjusted mean posttest scores of the classes in each treatment group on each grade level (for example, the scores of the four first-grade classes in the control group) were also tested for statistical significance using analysis of covariance. When COVAR F ratios were statistically significant, differences between pairs of adjusted means were tested for statistical significance using the effective error mean square (Winer, 1971); following significant ANOVA F ratios, Fisher's protected t test was used to compare pairs of means (Cohen & Cohen, 1983).

Generally, the emphasis in educational research has been on testing for statistical significance, which is relative to sample size. The reporting of differences between treatment and control group means in a metric not relative to N is important as a basis for asking whether they are of sufficient magnitude to be of educational or practical significance (Shaver, 1980). Two ways of assessing the magnitudes of differences are Eta-squared (η^2), which expresses the proportion of the total variation among scores associated with treatment group membership, and effect size (*ES*), the mean of the experimental group minus that of the control group divided by the standard deviation of the control group (Cohen, 1977). Both were computed for this study.

Results

Table 1 summarizes the results for the comparisons of the adjusted mean scores of experimental and control students, pooled across grade levels, on the dependent variables. All the treatment main effect differences were statistically significant at the .05 level. Those who participated in the TU activities had higher adjusted mean scores on seven of the measures (MTT productive thinking, forecasting, decision making, planning, and communicating; TTCT fluency and flexibility). For the other two comparisons (TTCT originality and elaboration), the control group adjusted means were higher. Despite statistical significance, the *ES* results indicate small effects for seven of the variables (MTT productive thinking, .21; planning, .27; decision making, .41; communication, .44; and TTCT originality, .19; fluency, .27; flexibility, .41) and moderate effects for two (MTT forecasting, .74, and TTCT elaboration, .63). With the ANOVA, the TTCT elaboration effect size was slightly smaller, .58. Eta-squared computations indicated that at least 10% of the variation was associated with treatment group membership in only two instances—in one of which, TTCT elaboration, the control group had the higher mean, and the η^2 was .09 for the ANOVA.

As might be expected, treatment effects were not consistent across all grade levels. Statistically significant interactions between grade level and treatment were found for all but two of the measures (MTT forecasting and TTCT fluency). Table 2 shows which grade level differences were not consistent with the overall TU-control group difference. There is no pattern of interactions across dependent variables. Mean differences were not statistically significant for MTT productive thinking, TTCT originality, and TTCT elaboration at the first-grade level, for MTT decision making and MTT planning at the fifth-grade level, for MTT communication at the second- and fifth-grade levels, and for TTCT flexibility at the second-grade level. The lack of a statistically significant mean difference for TTCT fluency at the second-grade level did not reflect a large enough departure from the overall difference between the overall TU and control group means to result in a statistically significant interaction.

For all but two of the dependent variables (MTT productive thinking and TTCT originality), there was a statistically significant difference among the grade-level main effect adjusted means, as reported in Table 2. There were statistically significant increases in adjusted mean scores from the first to the second to the fifth grade on three of the MTT measures (decision making, planning, and communication). For two of the TTCT scores (fluency and flexibility), there was a statistically significant increase in adjusted mean scores from the first to the second grade followed by a statistically significant decrease from the second to the fifth grade. Only for TTCT elaboration were there statistically significant decreases in mean scores from first to second to fifth grade; with the ANOVA, there was a slight, nonsignificant increase from the first- to the second-grade mean. The results of tests of the differences between control group means across grade levels were consistent with the overall comparisons, except for two instances: a statistically significant decrease in MTT productive thinking means from the second to fifth grade and a statistically significant increase in TTCT elaboration scores from the first to the second grades (which also occurred with the ANOVA).

Differences among class means within treatment category at each grade level were also tested for statistical significance. Of the 54 among-class comparisons of adjusted mean scores on the 9 dependent variables, 32 were significant at the .05 level. The statistically significant class differences were found in both the experimental and control groups (16 of 27 comparisons were statistically significant for both sets of groups). Moreover, on every dependent variable at every grade level there was overlap in the adjusted means of the experimental and control groups. That is, in no instance were all experimental group means higher than all control group means (or vice versa for the two TTCT comparisons on which the control group had statistically significant higher adjusted means than the TU group).

Discussion

To the extent that mean differences on the talent measures were the result of the TU activities, the effects upon students' performance were generally not striking. Even though the differences between the TU and control groups' adjusted mean scores with grade levels pooled were statistically significant for all of the dependent variables, the effect sizes and the associated relationships between TU-control group membership and scores on the dependent variables were relatively small: There was a range of only 1% to 4% of the variation among scores associated with treatment group membership for seven of the nine dependent variables.

As Gage (1984) has pointed out, an effect of small magnitude may be important, and one of rather large magnitude may be unimportant, depending on the cost of producing the difference and the benefits to be gained. In medical research, a treatment of moderate cost that accounts for even a small percentage of the

Table 1.—Posttest Results for Talents Unlimited and Control Groups

Variable	$\bar{X}$	*SD*	$\bar{X}_{adj}$	*F*	*ES*	r^2
Productive thinking						
TU	91.08	30.95	90.95			
Control	84.15	31.93	84.29	5.36*	.21	.01
Forecasting						
TU	3.49	1.66	3.44			
Control	2.31	1.45	2.36	57.91**	.74	.10
Decision making						
TU	6.18	2.62	6.02			
Control	4.78	2.63	4.95	23.74**	.41	.04
Planning						
TU	5.23	3.42	5.15			
Control	4.18	3.26	4.27	8.99**	.27	.02
Communication						
TU	8.18	3.99	8.08			
Control	6.35	3.65	6.47	22.23**	.44	.04
TTCT fluency						
TU	24.35	7.24	24.19			
Control	22.00	7.61	22.15	8.09**	.27	.02
TTCT flexibility						
TU	18.11	4.48	17.95			
Control	16.15	4.02	16.31	14.46**	.41	.03
TTCT originality						
TU	35.10	13.65	34.69			
Control	37.21	15.61	37.61^a	3.94*	.19	.01
TTCT elaboration						
TU	54.99	25.91	54.11			
Control	74.07	33.14	74.92^a	63.29**	.63	.11

Note. For the analyses, *df* ranged from 1/375 to 1/395.

^{a}Control group mean higher than TU group mean.

$^*p < .05$. $^{**}p < .01$.

variance on a dependent variable such as survival from heart attacks has great significance for practice (see also Gallo, 1978). The value of most dependent variables in educational research is not as self-evident nor as clear a matter of consensus (Larkins & Shaver, 1972). That is the case with the dependent measures in this study. The benefits accruing from a treatment that accounts for such small percentages of variation in students' production of ideas seems dubious, especially with evidence of an inconsistent treatment effect.

There was inconsistency of treatment effects across grade levels, as indicated by the statistically significant Treatment × Grade Level interactions with different patterns of mean differences at the different grade levels. Despite the significant treatment main effect for all dependent variables, the TU adjusted posttest means were not higher for MTT productive thinking at the first-grade level (in fact, there was a nearly 8 point nonstatistically significant reversal of means), for MTT communication and TTCT fluency and flexibility at the second-grade level, and for MTT decision making, planning, and communication at the fifth-grade level. The treatment main effect in favor of the control group on TTCT originality and elaboration was not present at the first-grade level.

The treatment effect appeared to be most consistent at the first-grade level, where in all but one instance the treatment group's MTT mean was statistically significantly higher, and there was no statistically significant depression of TTCT originality and elaboration scores. This is particularly interesting in light of Torrance's (1961) doubts that idea production could be enhanced with first graders.

Other evidence of lack of a consistent treatment effect comes from the statistically significant variability among means for both TU and control groups, with overlapping distributions of adjusted means for the TU and control groups at each grade level.

Table 2.—Adjusted Posttest Means by Grade Level

Variable	Group	Grade Level 1	Grade Level 2	Grade Level 5	Total
Productive thinking	TU	80.00	94.16[b]	99.79[b]	90.95[b]
	Control	87.77	85.58	74.72[d]	84.29
	Total	84.34	89.83	89.25	
Forecasting[a]	TU	3.20[b]	3.19[b]	4.26[b,d]	3.44[b]
	Control	2.05	2.32	2.95[d]	2.36
	Total[c]	2.61	2.75	3.62[d]	
Decision making	TU	4.62[b]	6.90[b,d]	6.85	6.02[b]
	Control	3.54	5.03[d]	7.11[d]	4.95
	Total[c]	4.08	5.97[d]	6.85[d]	
Planning	TU	4.72[b]	4.95[b]	6.34[d]	5.15[b]
	Control	2.91	4.03[d]	6.83[d]	4.27
	Total[c]	3.75	4.44[d]	6.45[d]	
Communication	TU	7.31[b]	7.55	10.22[d]	8.08[b]
	Control	4.61	6.77[d]	9.28[d]	6.47
	Total[c]	6.00	7.10[d]	9.70[d]	
TTCT fluency[a]	TU	22.30[b]	25.59[d]	23.67[b]	24.19[b]
	Control	20.02	25.09[d]	19.63[d]	22.15
	Total[c]	21.29	25.38[d]	22.08[d]	
TTCT flexibility	TU	16.80[b]	18.82[d]	18.02[b]	17.95[b]
	Control	14.82	18.45[d]	14.58[d]	16.31
	Total[c]	15.84	18.60[d]	16.34[d]	
TTCT originality	TU	36.35	32.20[b]	35.76[b]	34.60[b]
	Control	34.57	37.59	41.95	37.61
	Total	35.63	35.25	38.81	
TTCT elaboration	TU	72.25	49.06[b,d]	37.62[b,d]	54.11[b]
	Control	74.67	83.75[d]	62.79[d]	74.92
	Total[c]	72.88	65.84[d]	49.25[d]	

[a] Interaction between treatment and grade level not statistically significant ($p < .05$) for this variable. [b] Difference between TU and control group means statistically significant, $p < .05$. [c] Difference among grade level means statistically significant, $p < .05$. [d] Statistically significant ($p < .05$) difference from the mean at the next lower grade level.

It should be noted, however, the two comparisons in which the control group mean was higher (TTCT originality and elaboration) may not be indicative of inconsistent effects. The TTCT fluency and flexibility tests are production based, but the originality and elaboration scales are quality oriented. Torrance (1974) has noted that because the TTCT is a timed test, it is difficult for respondents to produce large numbers of ideas and also be original and embellish their ideas. The TU program, of course, emphasized production, so it was not surprising—in fact, it could have been anticipated as a treatment effect—that TU students got higher scores on the two TTCT production scales and did less well on the other two scales. Whether that effect is desirable, if it is not just an artifact of the timed test, is, of course, open to question.

For school districts considering adoption of the TU program, this study produced mixed evidence. The findings do not indicate that the TU procedures will increase students' scores on the talent measures in either a consistent or what we regard to be an educationally significant way. Implementation of the total TU program using TU-trained teachers as trainers may, it appears, produce different effects than when TU staff use the program or when only one or two of the talents are presented. The depression of TTCT originality and elaboration mean scores is also a matter of concern in the absence of clear evidence that it is an artifact of the timed test. On the other hand, the experimental teachers reported positive attitudes toward the Talents Unlimited approach. Such teacher enthusiasm is an important consideration in curriculum implementation. Districts that decide to adopt the approach should, if possible, conduct further evaluation studies, both for their own use and for the edification of other potential adopters.

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